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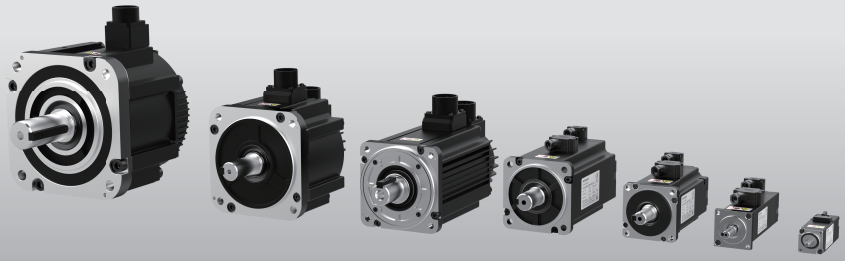

MS1-Z Series Servo Motor

Selection Guide

Industrial Automation

Intelligent Elevator

New Energy vehicle

Industrial Robot

Rail Transit

Data code 19012369A00

Preface

Thank you for purchasing the MS1-Z series servo motor.

As the latest generation of servo motors developed by Inovance, the MS1-Z series servo motor carries a power range from 0.03 kW to 7.5 kW, with flange sizes ranging from 25 mm to 180 mm. It offers multiple types of inertia and speed configurations and supports different types of encoders. The MS1-Z series servo motor serves to achieve quick and accurate position control, speed control and torque control in automation equipment such as semiconductors, SMT machines, PCB punching machines, material handling machineries, machine tools, and transmission machineries.

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

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

Precautions
◆ The drawings in the user guide are sometimes shown without covers or protective guards. Remember to install the covers or protective guards as specified first, and then perform operations in accordance with the instructions. ◆ The drawings in the user guide are shown for descriptions only and may not match the product you purchased. ◆ The user guide is subject to change without notice due to product upgrade, specification modifications as well as efforts to improve the accuracy and convenience of the user guide.

Revision History

Date	Version	Revision
December 2023	A00	First release

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Fundamental Safety Instructions

Safety Disclaimer

- Before installing, using, and maintaining this equipment, read the safety information and precautions thoroughly, and comply with them during operations.
- To ensure personal and equipment safety, observe the notes indicated on the product labels and all the safety instructions in the user guide.
- "CAUTION", "WARNING", and "DANGER" in the user guide only indicate some of the precautions that need to be followed; they just supplement the safety precautions.
- Use this equipment according to the designated environment requirements. Damage caused by improper usage is not covered by warranty.
- Inovance shall take no responsibility for any personal injury or property damage caused by improper usage.

Safety Levels and Definitions

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

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

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

Fundamental Safety Instructions

Unpacking
 ◆ Check whether the package is intact and whether there is damage, water seepage, dampness, and deformation before unpacking. ◆ Unpack the package by following the unpacking sequence. Do not strike the package violently. ◆ Check whether there are signs of damage, rust, or bumping on the surface of the equipment or accessories. ◆ Check whether the number of packing materials is consistent with the packing list.

WARNING

- Do not install the equipment if you find damage, rust, or signs of use on the equipment or accessories.
- Do not install the equipment if you find water seepage, component missing or damage upon unpacking.
- Do not install the equipment if you find the packing list does not conform to the equipment you received.

Storage and Transportation

CAUTION

- Store and transport this equipment based on the storage and transportation requirements for humidity and temperature.
- Avoid storing or transporting the equipment in environments with water splash, rain, direct sunlight, strong electric field, strong magnetic field, and strong vibration.
- Avoid storing the equipment for more than three months. Long-term storage requires strict protection and necessary inspections.
- Pack the equipment strictly before transportation. Use a sealed box for long-distance transportation.
- Never transport this equipment with other equipment or materials that may damage this equipment.

WARNING

- Use professional loading and unloading equipment to carry large-scale or heavy equipment.
- When carrying this equipment with bare hands, hold the equipment casing firmly with care to prevent parts from falling. Failure to comply may result in personal injury.
- Handle the equipment with care during transportation and mind your step to prevent personal injury or equipment damage.
- Never stand stay below the equipment when the equipment is being hoisted by the hoisting equipment.

Installation

WARNING

- Read through the safety instructions and user guide before installation.
- Do not retrofit this equipment.
- Do not fiddle with the bolts used to fix equipment components or the bolts marked in red.
- Do not install this equipment in places with strong electric or magnetic fields.
- When the equipment is installed in a cabinet or final assembly, a fireproof enclosure providing both electrical and mechanical protections must be provided. The IP rating must meet IEC standards and local laws and regulations.

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Installation, wiring, maintenance, inspection, or parts replacement must be performed only by experienced personnel who have attended the necessary electrical training courses.
- Installation personnel must be familiar with equipment installation requirements and relevant technical materials.
- Before installing equipments with strong electromagnetic interference, such as a transformer, install a shielding equipment for the equipment to prevent malfunction.

Wiring

DANGER

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Never perform wiring with power on. Failure to comply can result in electric shock.
- Make sure that the equipment is well grounded. Failure to comply will result in an electric shock.
- During wiring, follow the proper electrostatic discharge (ESD) procedures, and wear an antistatic wrist strap. Failure to comply will result in damage to internal equipment circuits.

WARNING

- Never connect the power cable to output terminals of the equipment. Failure to comply may cause equipment damage or even a fire.
- When connecting a drive to the motor, make sure that the phase sequences of the drive and motor terminals are consistent to prevent reverse motor rotation.
- Cables used for wiring must meet cross sectional area and shielding requirements. The shield of the cable must be reliably grounded at one end.
- After wiring, make sure there are no fallen screws or exposed wire inside the equipment.

Power-on

DANGER

- Before power-on, make sure that the equipment is installed properly with reliable wiring and the motor can be restarted.
- Before power-on, ensure that the power supply meets equipment requirements. Failure to comply will result in equipment damage or even a fire.
- During power-on, unexpected operations may be triggered on the equipment. Therefore, stay away from the equipment.
- After power-on, do not open the cabinet door and protective cover of the equipment. Failure to comply will result in an electric shock.
- Do not touch any wiring terminals during power-on. Failure to comply will result in an electric shock.
- After power-on, do not remove any part of the equipment. Failure to comply will result in an electric shock.

Operation

DANGER

- Do not touch any wiring terminals during operation. Failure to comply will result in an electric shock.
- Do not remove any part of the equipment during operation. Failure to comply will result in an electric shock.
- Do not touch the equipment enclosure, fan, or resistor with bare hands to sense the temperature. Failure to comply may result in personal injury.
- Signal detection during operation must be performed only by professionals. Failure to comply may result in personal injury or damage to the equipment.

- Prevent metal or other objects from falling into the device during operation. Failure to comply may result in equipment damage.
- Do not start or stop the equipment by using the contactor. Failure to comply may result in equipment damage.

Maintenance

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not maintain the equipment with power ON. Failure to comply will result in an electric shock.

- Perform daily and periodic inspection and maintenance for the equipment according to maintenance requirements and keep a maintenance record.

Repair

- Equipment installation, wiring, maintenance, inspection, or parts replacement must be performed only by professionals.
- Do not repair the equipment with power ON. Failure to comply will result in an electric shock.

- Submit the repair request according to the warranty agreement.
- When the equipment is faulty or damaged, the troubleshooting and repair work must be performed by professionals that follow the repair instructions, with repair records kept properly.
- Replace quick-wear parts of the equipment according to the replacement instructions.
- Do not operate damaged equipment. Failure to comply may result in worse damage.
- After the equipment is replaced, check the wiring and set parameters again.

Disposal

- Dispose of retired equipment in accordance with local regulations and standards. Failure to comply may result in property damage, personal injuries, or even death.
- Recycle retired equipment by observing industry waste disposal standards to avoid environmental pollution.

Safety label

Read the user guide before installation and operation.

Reliably ground the system and equipment.

Danger!

High voltage!

Prevent personal injuries caused by machines.

High temperature!

- China Energy Label

中国能效标识
CHINA ENERGY LABEL

The energy certification of MS1 series motors is compliant with standard GB 30253-2013. See the QR code of the China Energy Label on the motor for details.

1 Product Information

1.1 Motor Nameplate and Model

MS1 H 4 - 75B 30C B A3 3 1 Z-S
① ②③ ④ ⑤ ⑥ ⑦⑧⑨ ⑩

① **MS1 series servo motor**	⑥ Voltage class (V) B: 220 D: 380
② Product series H: Maximum speed higher than the rated speed V: Maximum speed equal to the rated speed	⑦ Encoder type One letter and one digit A3: 23-bit multi-turn absolute encoder T3: 18-bit multi-turn encoder U2: 20-bit single-turn absolute encoder*
③ Type 1: Low inertia, small capacity 2: Low inertia, medium capacity 3: Medium inertia, medium capacity 4: Medium inertia, small capacity	⑧ Shaft connection mode 1: Plain shaft* 3: Solid, with key and tapped hole
④ Rated power (W) Comprised of two digits and a letter B: x 10 C: x 100 Example: 75B: 750 W	⑨ Brake, reducer and oil seal 0: None 1: Oil seal 2: Brake 4: Oil seal+Brake
⑤ Rated speed (rpm) B: x 10 C: x 100 Example: 30C: 3,000 rpm	⑩ Sub-series Z: Terminal type Z- S: Flying leads type

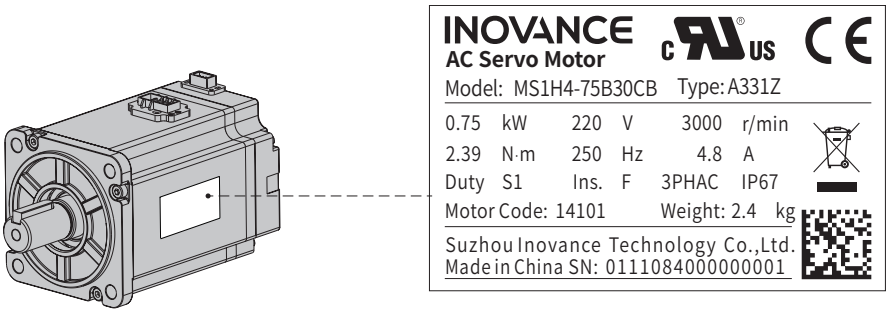


Figure 1-1 Description of motor model and nameplate

NOTE

Those marked with an asterisk are dedicated for motors in flange size 25.

1.2 Components

■ Figure 12 and Figure 13 show the components of motors in flange sizes 40, 60, and 80.

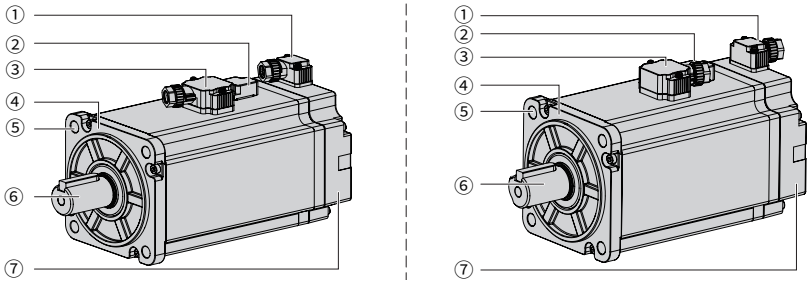


Figure 1-2 Components of terminal-type motor

No.	Name
①	Encoder connector
②	Brake
③	Power connector
④	Mounting flange face
⑤	Mounting screw through-hole
⑥	Output shaft
⑦	Encoder

NOTE

Only the brake motor is equipped with a brake.

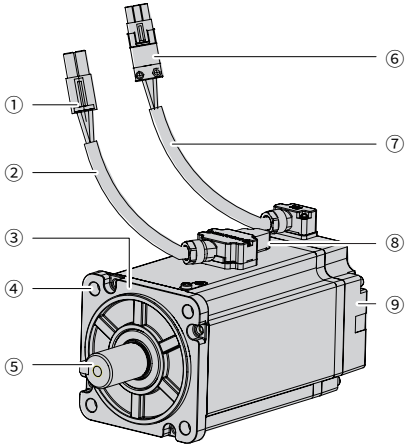


Figure 1-3 Components of flying leads type motors

No.	Name
①	Power cable connector
②	Power cable
③	Mounting flange face
④	Mounting screw through-hole
⑤	Output shaft
⑥	Encoder connector
⑦	Encoder cable
⑧	Brake
⑨	Encoder (detection part)

NOTE

Only the brake motor is equipped with a brake.

■ The following figure shows components of motors in flange sizes 100, 130, and 180.

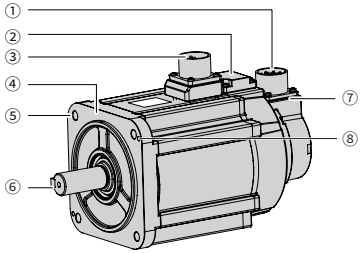


Figure 1-4 Components of aviation connector-type motors in flange sizes 100, 130, and 180

No.	Name
①	Encoder aviation connector
②	Brake
③	Power cable aviation connector
④	Mounting flange face
⑤	Mounting screw through-hole
⑥	Output shaft
⑦	Encoder
⑧	Motor disassembly hole

NOTE

Only the brake motor is equipped with a brake.

1.3 System Structure

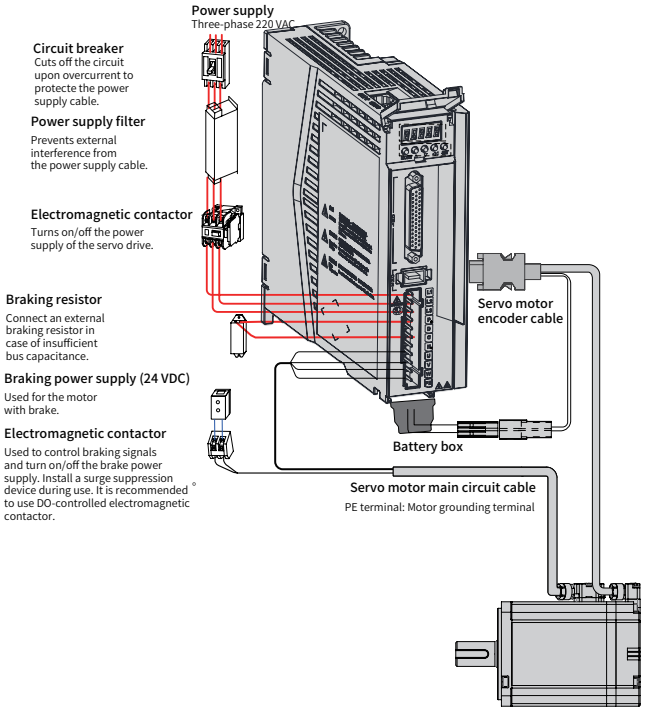
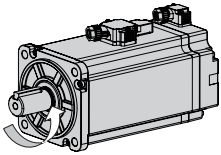


Figure 1-5 System Composition

1.4 General Specifications

1.4.1 Mechanical Characteristics

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

Item		Description
Environmental conditions	Ambient temperature	0°C to 40°C (non-frozen) (Derate based on the derating curve for temperatures above 40°C .)
	Ambient humidity	20% to 80% (without condensation)
	Installation location	Free from corrosive or explosive gases Well ventilated and with minimum amount of dust, waste and moisture. Convenient for inspection and cleanup. Below 1000 m (derating required for altitudes above 1000 m) Away sources that may generate strong magnetic field Away from heating sources such as a heating stove Use the motor with oil seal in places with grinding fluid, oil mist, iron powders or cuttings. The oil seal is only dust-proof. It cannot withstand the intrusion of oil for a long term. Not applicable to vacuum environment Not applicable to inching condition, which may result in stuck. The motor with brake may generate a pattering sound. Coupler type and installation alignment requirements The system should avoid continuous operation at natural frequency. Exceeding the allowable vibration value may damage the system.
	Storage environment	Observe the following requirements for storing a de-energized motor. Temperature: -20°C to +60°C (non-frozen) Humidity: 20% to 80% RH (without condensation)
Vibration resistance[3]	Vibration acceleration (flange face as standard)	Below 49 m/s^2
Shock resistance[2]	Shock acceleration (flange face as standard)	Below 490 m/s^2
	Number of shocks	2

NOTE

- [1] Vibration grade V15 indicates that the vibration amplitude is lower than 15 μm when the motor is operating at rated speed.
- [2] The resistance for shock in the vertical direction when the servo motor is mounted with the shaft in a horizontal position is shown in the preceding table.
- [3] The vertical, side-to-side, and front-to-back resistance for vibration in three directions when the servo motor is mounted with the shaft in a horizontal position is shown in the preceding table.
- The vibration intensity applied on the motor varies with applications.

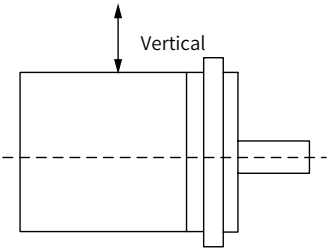


Figure 1-6 Shock applied on the motor

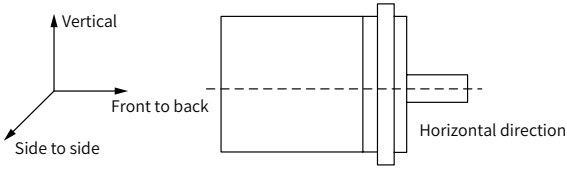


Figure 1-7 Vibration applied on the motor

1.4.2 Overload Characteristics

■ MS1H1 (25-flange motors excluded)/MS1H4

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

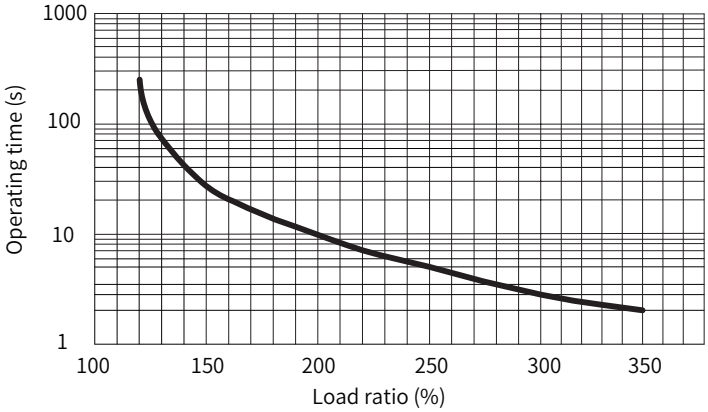


Figure 1-8 Motor overload curve

NOTE

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

■ MS1H1-03B30CB-U210Z-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

Load ratio (%)	Operating time (s)
320	1.73
330	1.60
340	1.50
350	1.40

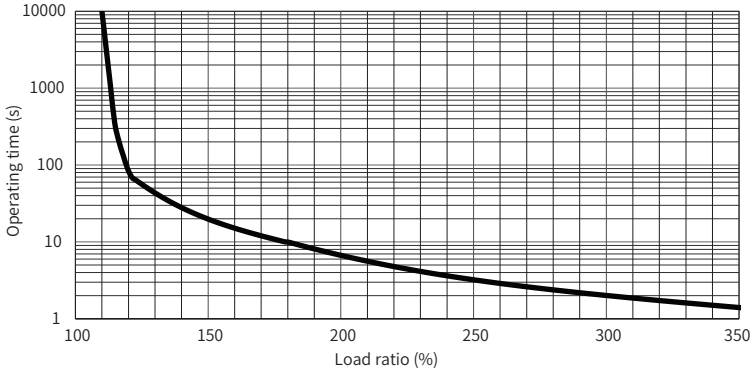


Figure 1-9 Overload curve of MS1H1-03B30CB-U210Z-S series motors

■ MS1H2/MS1H3

Load ratio (%)	Operating time (s)
115%	6000
121.40%	2000
127.80%	1000
134.20%	800
140.60%	500
147%	300
153.40%	150
159.80%	100
166.20%	80
172.60%	60
179.00%	50
185.40%	45
191.80%	40
198.20%	36
204.60%	32
211.00%	28

Load ratio (%)	Operating time (s)
217.40%	23
223.80%	22
230.20%	19
236.60%	18
243.00%	15
249.40%	14
255.80%	13
262.20%	11
268.60%	10
275.00%	9
281.40%	8
287.80%	7
294.20%	6

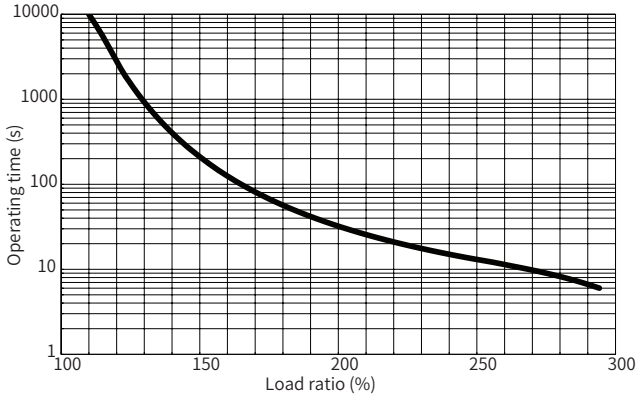


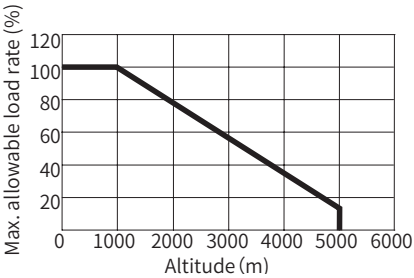
Figure 2-1 Overload curve of MS1H2 and MS1H3 series motors

NOTE

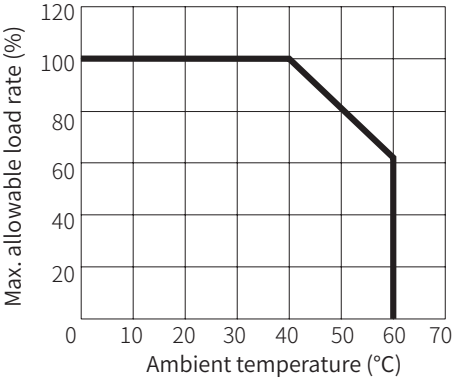
- The maximum torque of H2 models is 3 x rated torque.
- The maximum torque of H3 models is 2.5 x rated torque.

1.4.3 Derating Characteristics

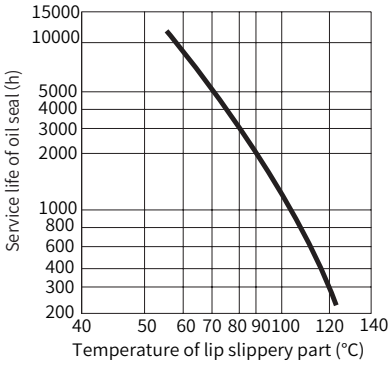
■ Altitude-based derating curve



■ Temperature-based derating curve



1.4.4 Temperature Curve of Oil Seal



1.5 Model Table

Inertia Capacity	Flange size (mm)	Rated power (kW)	Rated speed (maximum speed) (rpm)	Voltage class (V)	Motor model	Applicable drive	Page
MS1H1 Low inertia, small capacity	25	0.03	3000 (6000)	220	MS1H1-03B30CB-U210Z-S	S1R6	25
	40	0.05			MS1H1-05B30CB-*33*Z(-S)		26
	40	0.1			MS1H1-10B30CB-*33*Z(-S)		28
	60	0.2			MS1H1-20B30CB-*33*Z(-S)		30
	60	0.4			MS1H1-40B30CB-*33*Z(-S)	S2R8	32
	80	0.55			MS1H1-55B30CB-*33*Z(-S)	S5R5	34
	80	0.75			MS1H1-75B30CB-*33*Z(-S)		36
	80	1			MS1H1-10C30CB-*33*Z(-S)	S7R6/S012	39
MS1H2 low inertia, medium capacity	100	1	3000(6000)	220	MS1H2-10C30CB-A33*Z	S7R6	41
	100	1.5	3000(5000)		MS1H2-15C30CB-A33*Z	S012	<?>
	100	1	3000(6000)	380	MS1H2-10C30CD-A33*Z	T5R4	44
	100	1.5	3000 (5000)		MS1H2-15C30CD-A33*Z		46
	100	2			MS1H2-20C30CD-A331Z	T8R4	48
	100	2			MS1H2-20C30CD-A334Z-S4		49
	100	2.5			MS1H2-25C30CD-A331Z	T8R4/T012	51
	100	2.5			MS1H2-25C30CD-A334Z-S4		52
	130	3			MS1H2-30C30CD-A331Z	T012	54
	130	3			MS1H2-30C30CD-A334Z-S4		55
	130	4			MS1H2-40C30CD-A331Z	T017	56
	130	4			MS1H2-40C30CD-A334Z-S4		58
	130	5			MS1H2-50C30CD-A331Z	T017/T021	59
	130	5			MS1H2-50C30CD-A334Z-S4		61
MS1H4 medium inertia, small capacity	40	0.1	3000 (6000)	220	MS1H4-10B30CB-A33*Z	S1R6	62
	60	0.4			MS1H4-40B30CB-*33*Z(-S)	S2R8	65
	80	0.75			MS1H4-75B30CB-*33*Z(-S)	S5R5	67
MS1H3 medium inertia, medium capacity	130	0.85	1500 (3000)	220	MS1H3-85B15CB-*33*Z	S7R6	69
	130	1.3			MS1H3-13C15CB-*33*Z	S012	71
	130	0.85		380	MS1H3-85B15CD-*33*Z	T3R5	73
	130	1.3			MS1H3-13C15CD-*33*Z	T5R4	75
	130	1.8			MS1H3-18C15CD-*33*Z	T8R4	77
	180	2.9			MS1H3-29C15CD-A33*Z	T012	79
	180	4.4			MS1H3-44C15CD-A33*Z	T017	81
	180	5.5			MS1H3-55C15CD-A33*Z	T021	83
	180	7.5			MS1H3-75C15CD-A33*Z	T026	85

2. Motor Model Selection

2.1 Description for Model Selection

- The motor with oil seal must be derated by 10% during use.
- The brake cannot share the same power supply with other electrical devices. This is to prevent a malfunction of the brake due to voltage or current drop caused by other operating electrical devices.
- Use cables with a cross-sectional area above 0.5 mm^2.
- Technical data and torque/speed characteristic values in the following tables are applicable to motors working with Inovance servo drives with the armature coil temperature being 20° C.
- The characteristic values are obtained in cases where the motor is installed with the following heatsink:

  MS1H1/MS1H4: 250 mm x 250 mm x 6 mm (aluminum)

  MS1H2-10C to 25C: 300 mm x 300 mm x 12 mm (aluminum)

  MS1H2-30C to 50C: 400 mm x 400 mm x 20mm (aluminum)

  MS1H3-85B to 18C: 400 mm x 400 mm x 20 mm (aluminum)

  MS1H3-29C to 75C: 360 mm x 360 mm x 25 mm (doubled aluminum)

- Radial and axial loads of the motor

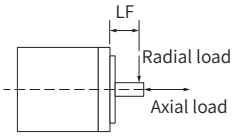


Figure 2-2 Radial and axial loads of the motor

- The tightening tension for terminal screws must be between 0.19 N·m to 0.21 N·m, exceeding of which may damage the terminal.
- Dimensions in the following dimension drawings are in millimeters (mm).
- Values inside brackets "()" are for the motor with a holding brake.
- Motor models ending with "-S4" represents the duty type S4, indicating the motor is working under S4 duty, with the motor load ratio not exceeding 70%.
- The tightening torque of the aviation connector is 0.6 N·m to 0.9 N·m (use aviation connectors designated by Inovance).

2.2 MS1H1 Motors with Low Inertia and Small Capacity

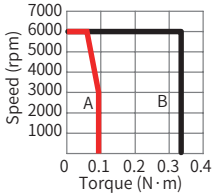
2.2.1 MS1H1-03B30CB-U210Z-S

Motor specifications	
Flange size (mm)	25
Inertia, capacity	Low inertia, small capacity
Rated output (kW)	0.03
Voltage (V)	220
Rated torque (N·m)	0.0955
Maximum torque (N·m)	0.33
Continuous current (Arms)	0.93
Maximum current (Arms)	4.2
Rated speed (rpm)	3000
Maximum speed (rpm)	6000
Torque coefficient (N•m/Arms)	0.11
Rotor moment of inertia ($kg \cdot cm^2$)	0.00668

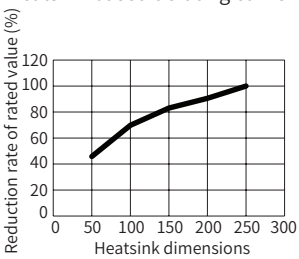
■ Torque-Speed characteristics

A — Continuous duty zone

B — Intermittent duty zone



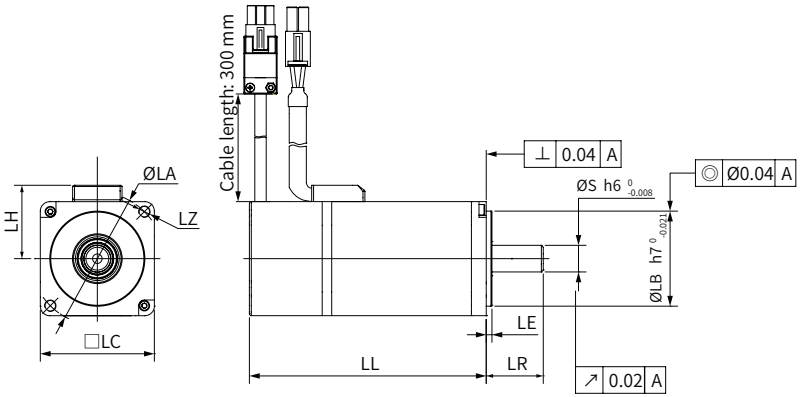
■ Heatsink-based derating curve



■ Allowable load

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

■ Dimensions

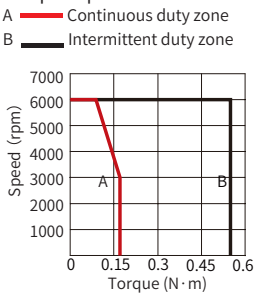


LL	LC	LR	LA	LZ	LH	LG	LE	LJ
73.5	25	16±0.5	28	3	17	-	2.5±0.3	-
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
5	20	-	-	-	-	-	-	0.2

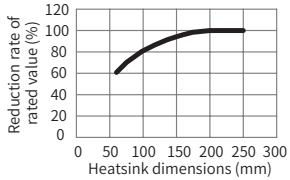
2.2.2 MS1H1-05B30CB-*33*Z(-S)

Motor specifications		
Flange size (mm)	40	
Inertia, capacity	Low inertia, small capacity	
Rated output (kW)	0.05	
Voltage (V)	220	
Rated torque (N·m)	0.16	
Maximum torque (N·m)	0.56	
Continuous current (Arms)	1.3	
Maximum current (Arms)	4.70	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N•m/Arms)	0.15	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	0.026
	Brake motor	0.028

■ Torque-Speed characteristics



■ Heatsink-based derating curve



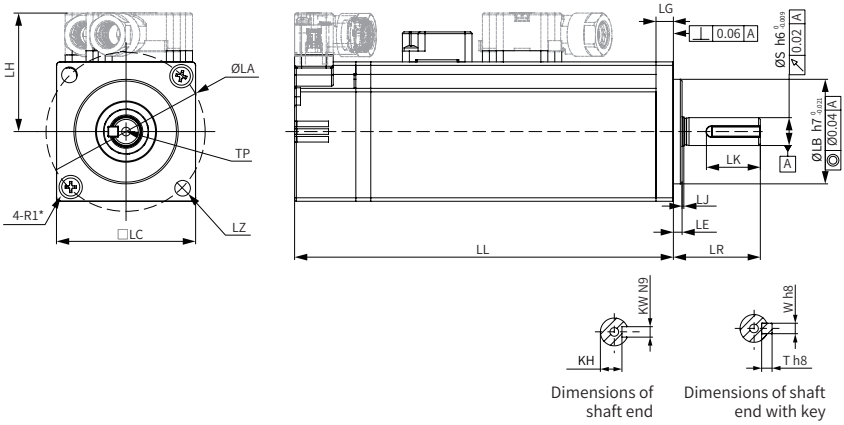
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

■ Allowable load

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

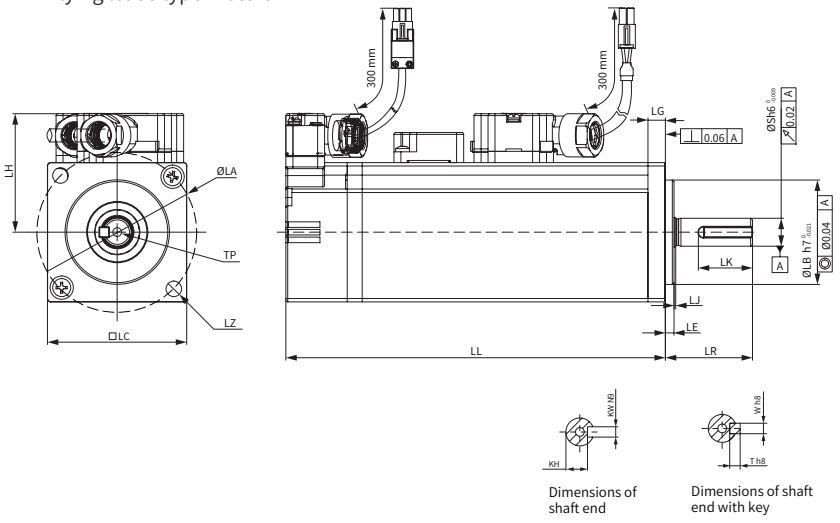
■ Terminal-type motors



Dimensions of shaft end

Dimensions of shaft end with key

■ Flying leads type motors



Dimensions of shaft end

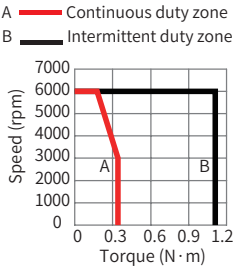
Dimensions of shaft end with key

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
65(96)	40	25±0.5	46	2-Ø4.5	34	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3×6	15.5	6.2 $^{0}_{-0.1}$	3	3	3	0.39(0.50)

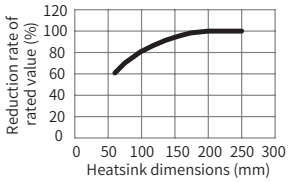
2.2.3 MS1H1-10B30CB-*33*Z(-S)

Motor specifications		
Flange size (mm)	40	
Inertia, capacity	Low inertia, small capacity	
Rated output (kW)	0.1	
Voltage (V)	220	
Rated torque (N·m)	0.32	
Maximum torque (N·m)	1.12	
Continuous current (Arms)	1.3	
Maximum current (Arms)	4.70	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.26	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	0.041
	Brake motor	0.043

■ Torque-Speed characteristics



■ Heatsink-based derating curve



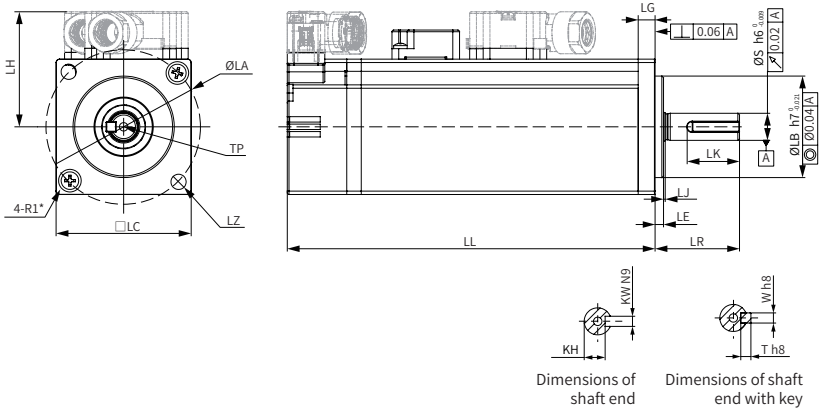
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

■ Allowable load

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

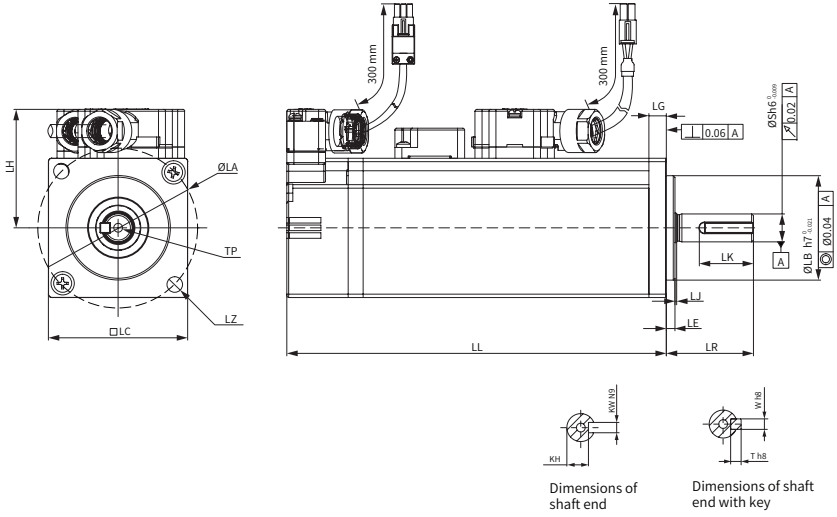
■ Terminal-type motors



Dimensions of shaft end

Dimensions of shaft end with key

■ Flying leads type motors



Dimensions of shaft end

Dimensions of shaft end with key

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
77.5(109)	40	25±0.5	46	2-Ø4.5	34	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3×6	15.5	6.2 $^{0}_{-0.1}$	3	3	3	0.45(0.64)

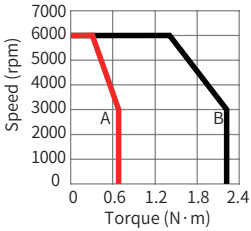
2.2.4 MS1H1-20B30CB-*33*Z(-S)

Motor specifications		
Flange size (mm)	60	
Inertia, capacity	Low inertia, small capacity	
Rated output (kW)	0.2	
Voltage (V)	220	
Rated torque (N·m)	0.64	
Maximum torque (N·m)	2.24	
Continuous current (Arms)	1.5	
Maximum current (Arms)	5.80	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.46	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	0.207
	Brake motor	0.22

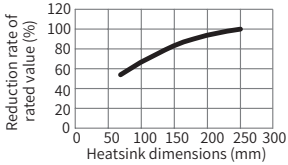
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



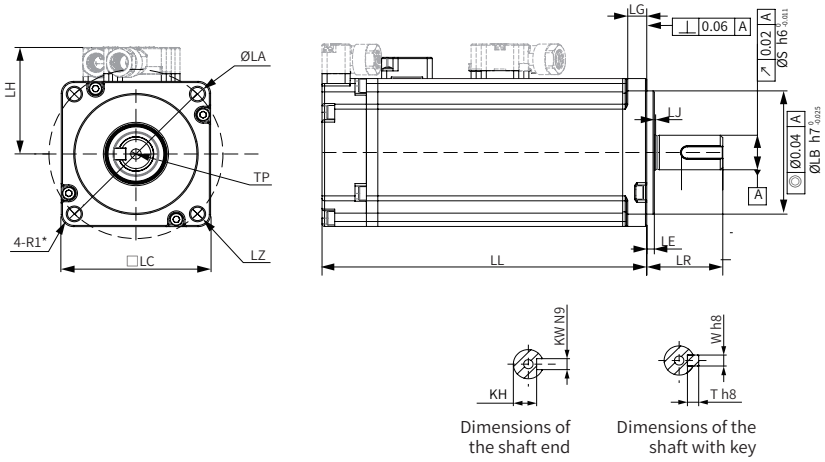
■ Electrical specifications of the brake

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

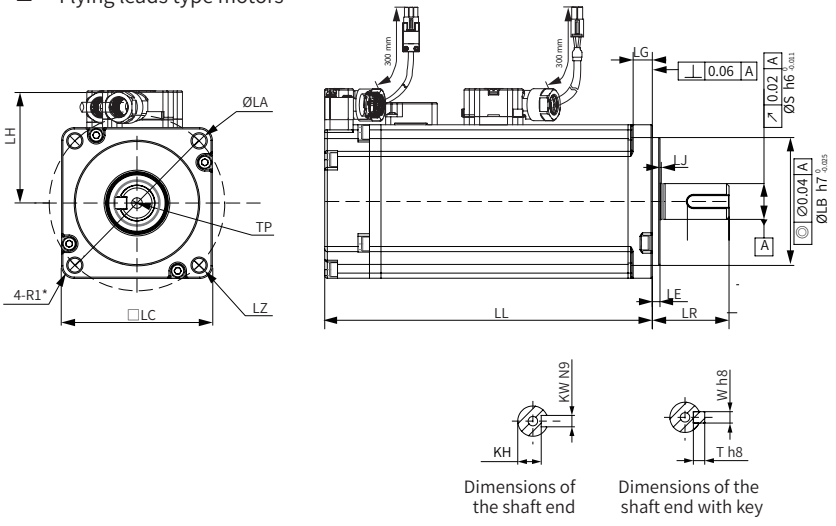
■ Terminal-type motors



Dimensions of the shaft end

Dimensions of the shaft with key

■ Flying leads type motors



Dimensions of the shaft end

Dimensions of the shaft end with key

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
72.5(100)	60	30±0.5	70	4-Ø5.5	44	7.5	3±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
14	50	M5×8	17.5	11 $^{0}_{-0.1}$	5	5	5	0.78(1.16)

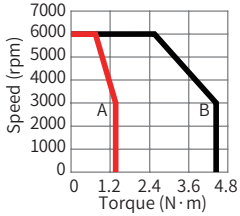
2.2.5 MS1H1-40B30CB-*33*Z(-S)

Motor specifications		
Flange size (mm)	60	
Inertia, capacity	Low inertia, small capacity	
Rated output (kW)	0.4	
Voltage (V)	220	
Rated torque (N·m)	1.27	
Maximum torque (N·m)	4.46	
Continuous current (Arms)	2.8	
Maximum current (Arms)	10.1	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.53	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	0.376
	Brake motor	0.39

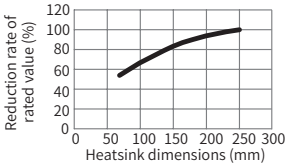
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



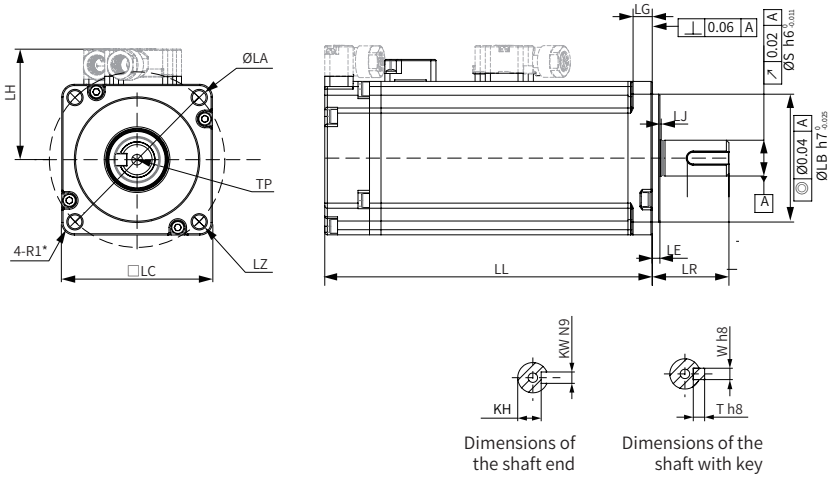
■ Electrical specifications of the brake

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

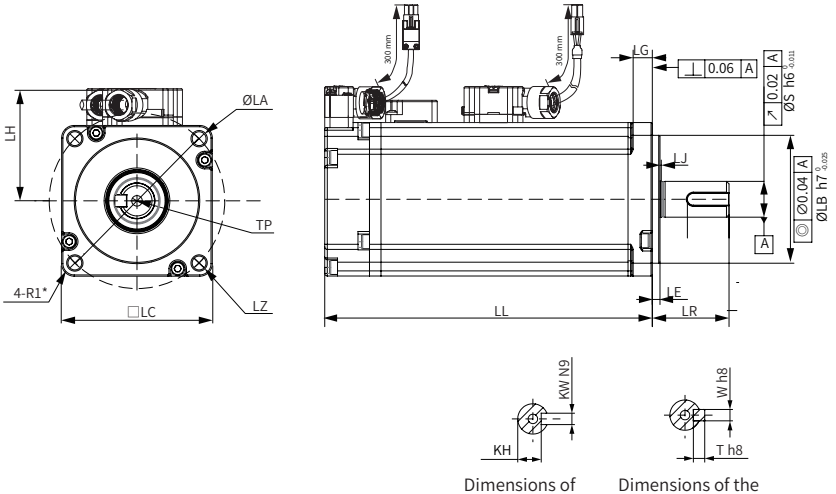
■ Terminal-type motors



Dimensions of the shaft end

Dimensions of the shaft with key

■ Flying leads type motors



Dimensions of the shaft end

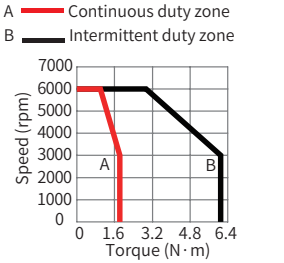
Dimensions of the shaft end with key

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
91(119)	60	30±0.5	70	4-Ø5.5	44	7.5	3±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
14	50	M5×8	17.5	11 $^{0}_{-0.1}$	5	5	5	1.11(1.48)

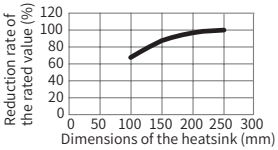
2.2.6 MS1H1-55B30CB-*33*Z(-S)

Motor specifications	
Flange size (mm)	80
Inertia, capacity	Low inertia, small capacity
Rated output (kW)	0.55
Voltage (V)	220
Rated torque (N·m)	1.75
Maximum torque (N·m)	6.13
Continuous current (Arms)	3.8
Maximum current (Arms)	15
Rated speed (rpm)	3000
Maximum speed (rpm)	6000
Torque coefficient (N·m/Arms)	0.49
Rotor moment of inertia (kg·cm^2)	1.06

■ Torque-Speed characteristics



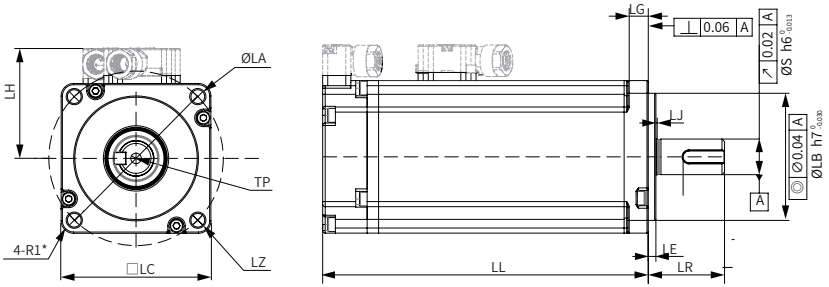
■ Heatsink-based derating curve

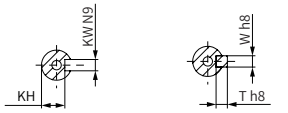


■ Allowable load

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

■ Terminal-type motors

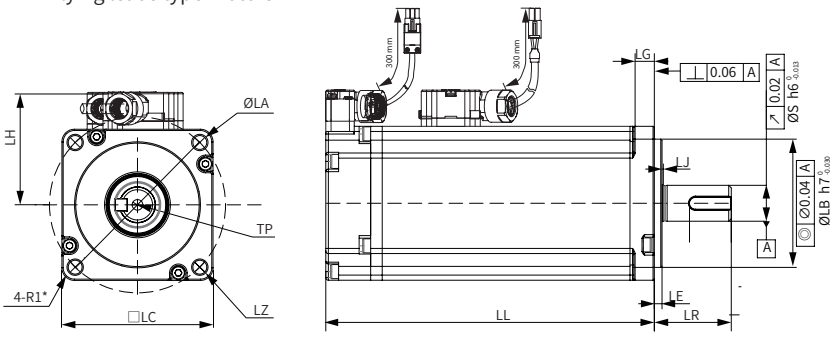


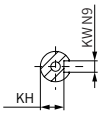


Dimensions of the shaft end

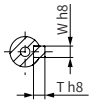
Dimensions of the shaft end with key

■ Flying leads type motors





Dimensions of the shaft end



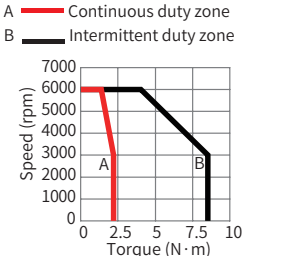
Dimensions of the shaft end with key

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
96.2	80	35±0.5	90	4-Ø7	54	7.7	3±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
19	70	M6x20	26	15.5 $^{0}_{-0.1}$	6	6	6	1.85

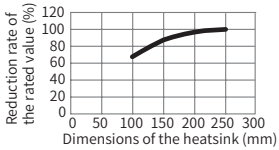
2.2.7 MS1H1-75B30CB-*33*Z(-S)

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Low inertia, small capacity	
Rated output (kW)	0.75	
Voltage (V)	220	
Rated torque (N·m)	2.39	
Maximum torque (N·m)	8.36	
Continuous current (Arms)	4.8	
Maximum current (Arms)	16.9	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.58	
Rotor moment of inertia (kg·cm^2)	Brake-less motor	1.38
	Brake motor	1.43

■ Torque-Speed characteristics



■ Heatsink-based derating curve



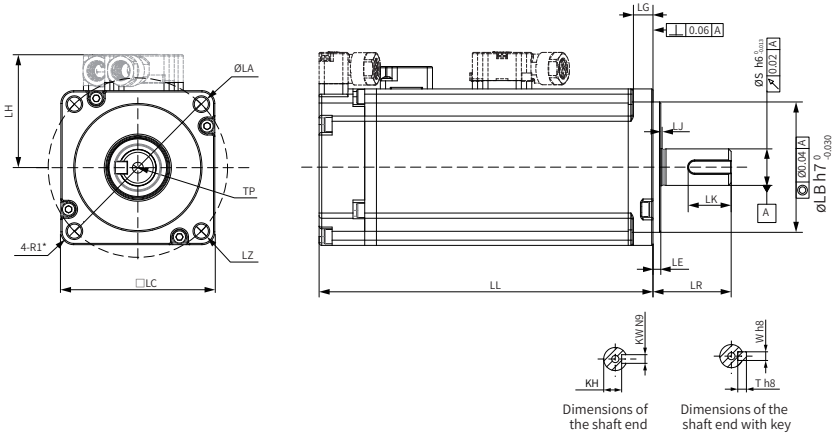
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1

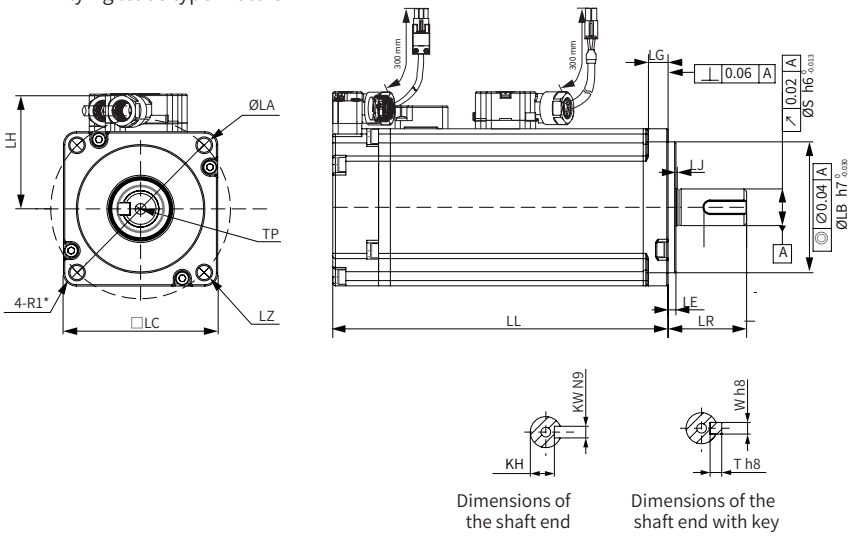
■ Allowable load

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

■ Terminal-type motors


LG
0.06 A
ØLA
LH
TP
4-R1*
LZ
□LC
Ø5 h6 -0.011
0.02 A
J J
Ø0.04 A
øL B h7 -0.030
LK
A
LE
LL
LR
KW N9
KH
W h8
T h8
Dimensions of the shaft end
Dimensions of the shaft end with key

■ Flying leads type motors



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
107(140)	80	35±0.5	90	4-Ø7	54	7.7	3±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
19	70	M6x20	26	15.5 $^{0}_{-0.1}$	6	6	6	2.18(2.82)

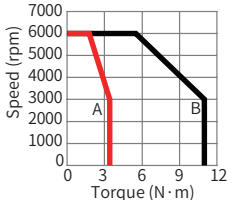
2.2.8 MS1H1-10C30CB-*33*Z(-S)

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Low inertia, small capacity	
Rated output (kW)	1.0	
Voltage (V)	220	
Rated torque (N·m)	3.18	
Maximum torque (N·m)	11.1	
Continuous current (Arms)	7.6	
Maximum current (Arms)	28	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.46	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	1.75
	Brake motor	1.86

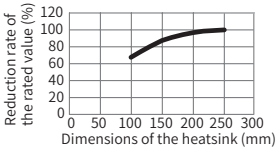
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



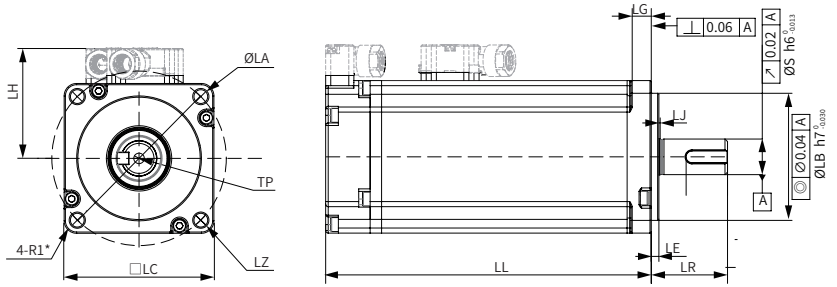
■ Electrical specifications of the brake

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

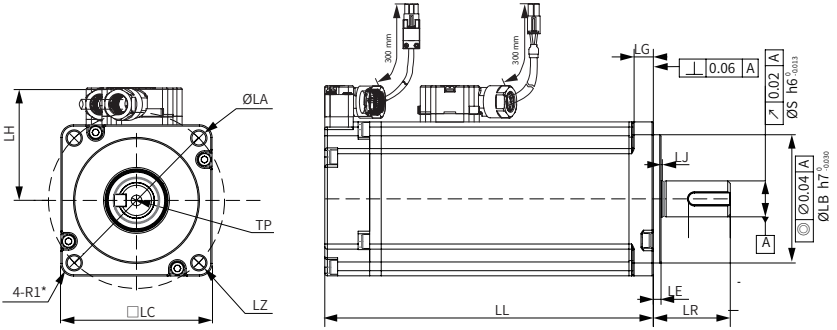
■ Terminal-type motors



Dimensions of the shaft end

Dimensions of the shaft end with key

■ Flying leads type motors



Dimensions of the shaft end

Dimensions of the shaft end with key

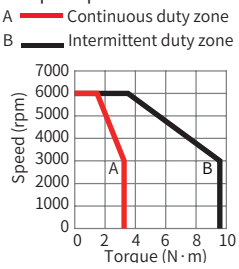
LL	LC	LR	LA	LZ	LH	LG	LE	LJ
118.2	80	35±0.5	90	4-Ø7	54	7.7	3±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
19	70	M6x20	26	$15.5^{\ 0}_{-0.1}$	6	6	6	2.55

2.3 MS1H2 Motors with Low Inertia and Medium Capacity

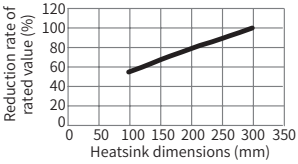
2.3.1 MS1H2-10C30CB-*33*Z

Motor specifications		
Flange size (mm)	100	
Inertia, capacity	Low inertia, medium capacity	
Rated output (kW)	1.0	
Voltage (V)	220	
Rated torque (N·m)	3.18	
Maximum torque (N·m)	9.54	
Continuous current (Arms)	7.5	
Maximum current (Arms)	23	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.47	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	1.87
	Brake motor	3.12

■ Torque-Speed characteristics



■ Heatsink-based derating curve



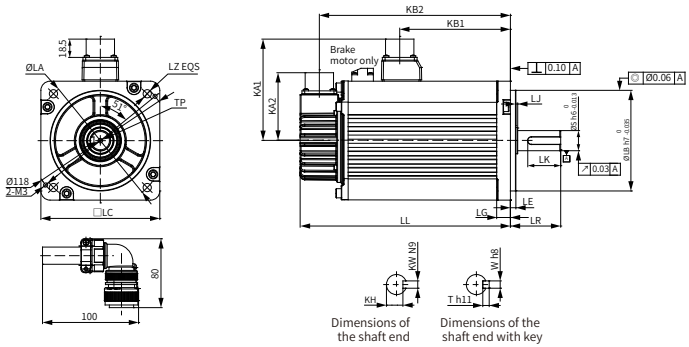
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	23	25	0.96	⩽ 85	⩽ 30	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KA2	LJ		KB1	KB2	
164(213.5)	100	5±0.3	115	4-Ø7	88	74	2.5±0.75		94.5(101)	143.5(192.5)	
LR		S	LB	TP	LK	KH	kW	W	T	LG	Weight (kg)
45±1		24	95	M8×16	36	20 $^{0}_{-0.2}$	8	8	7	10	5.11(6.41)

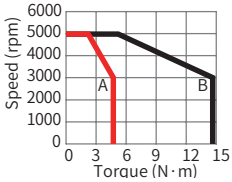
2.3.2 MS1H2-15C30CB-*33*Z

Motor specifications		
Flange size (mm)	100	
Inertia, capacity	Low inertia, medium capacity	
Rated output (kW)	1.5	
Voltage (V)	220	
Rated torque (N·m)	4.9	
Maximum torque (N·m)	14.7	
Continuous current (Arms)	10.8	
Maximum current (Arms)	32	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	0.54	
Rotor moment of inertia (kg·cm^2)	Brake-less motor	2.46
	Brake motor	3.71

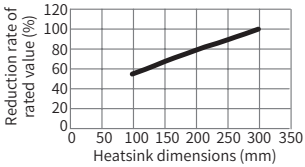
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



■ Electrical specifications of the brake

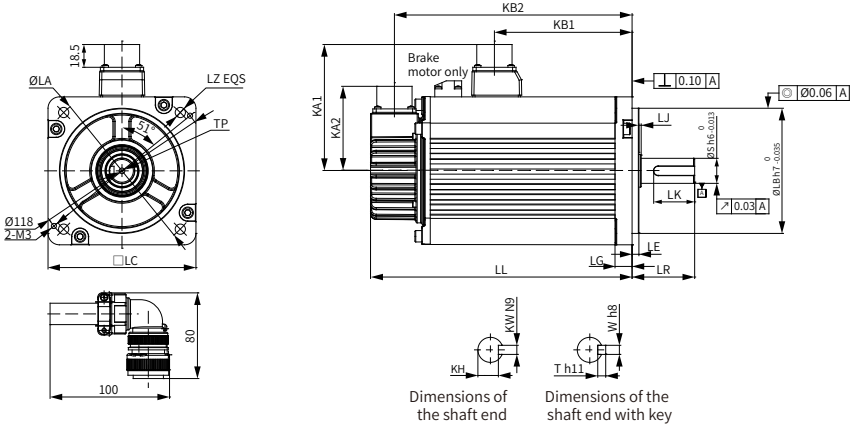
Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)

8	24	23	25	0.96	⩽ 85	⩽ 30	⩽ 0.5

■ Allowable load

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

■ Dimensions

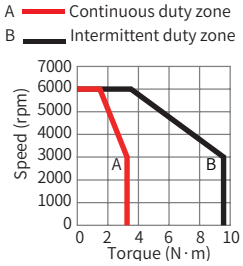


LL	LC	LE	LA	LZ	KA1	KA2	LJ		KB1	KB2	
189(239)	100	5±0.3	115	4-Ø7	88	74	2.5±0.75		119.5(128)	168.5(219.5)	
LR		S	LB	TP	LK	KH	kW	W	T	LG	Weight (kg)
45±1		24	95	M8×16	36	$20^{0}_{-0.2}$	8	8	7	10	6.22(7.52)

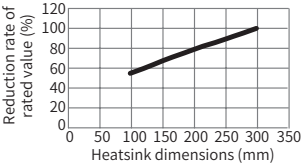
2.3.3 MS1H2-10C30CD-*33*Z

Motor specifications		
Flange size (mm)	100	
Inertia, capacity	Low inertia, medium capacity	
Rated output (kW)	1	
Voltage (V)	380	
Rated torque (N·m)	3.18	
Maximum torque (N·m)	9.54	
Continuous current (Arms)	3.65	
Maximum current (Arms)	11	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.89	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	1.87
	Brake motor	3.12

■ Torque-Speed characteristics



■ Heatsink-based derating curve



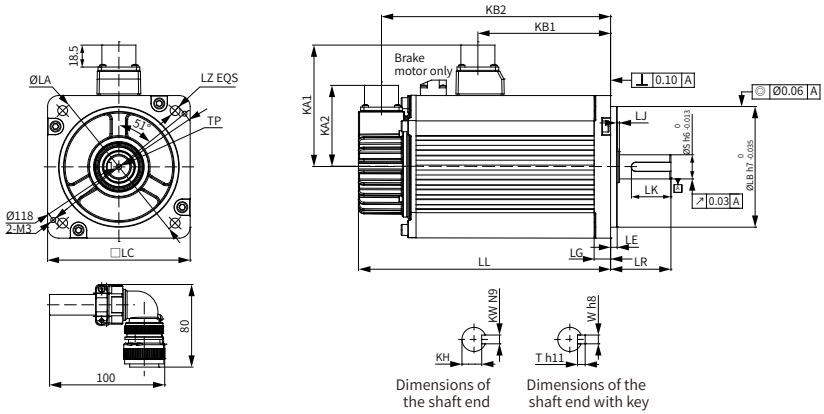
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	23	25	0.96	⩽ 85	⩽ 30	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KA2	LJ		KB1	KB2	
164(213.5)	100	5±0.3	115	4-Ø7	88	74	2.5±0.75		94.5(101)	143.5(192.5)	
LR		S	LB	TP	LK	KH	kW	W	T	LG	Weight (kg)
45±1		24	95	M8×16	36	$20^{\ 0}_{-0.2}$	8	8	7	10	5.11(6.41)

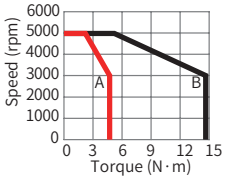
2.3.4 MS1H2-15C30CD-*33*Z

Motor specifications		
Flange size (mm)	100	
Inertia, capacity	Low inertia, medium capacity	
Rated output (kW)	1.5	
Voltage (V)	380	
Rated torque (N·m)	4.9	
Maximum torque (N·m)	14.7	
Continuous current (Arms)	4.5	
Maximum current (Arms)	14	
Rated speed (rpm)	3000	
Maximum speed (rpm)	5000	
Torque coefficient (N·m/Arms)	1.07	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	2.46
	Brake motor	3.71

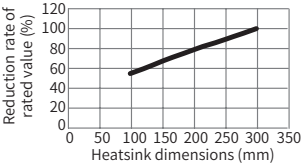
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



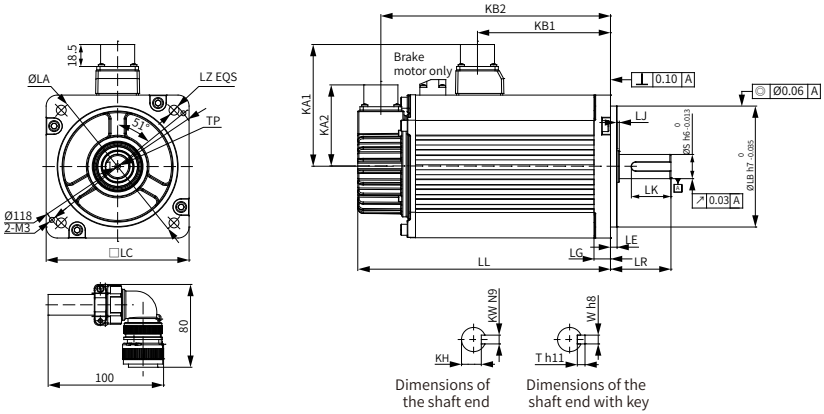
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	23	25	0.96	⩽ 85	⩽ 30	⩽ 0.5

■ Allowable load

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

■ Dimensions

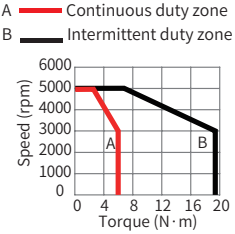


LL	LC	LE	LA	LZ	KA1	KA2	LJ		KB1	KB2	
189(239)	100	5±0.3	115	4-Ø7	88	74	2.5±0.75		119.5(128)	168.5(219.5)	
LR		S	LB	TP	LK	KH	kW	W	T	LG	Weight (kg)
45±1		24	95	M8×16	36	$20^{\ 0}_{-0.2}$	8	8	7	10	6.22(7.52)

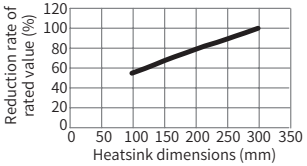
2.3.5 MS1H2-20C30CD-*331Z

Motor specifications	
Flange size (mm)	100
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	2
Voltage (V)	380
Rated torque (N·m)	6.36
Maximum torque (N·m)	19.1
Continuous current (Arms)	5.89
Maximum current (Arms)	20
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.19
Rotor moment of inertia (kg·cm^2)	3.06

■ Torque-Speed characteristics



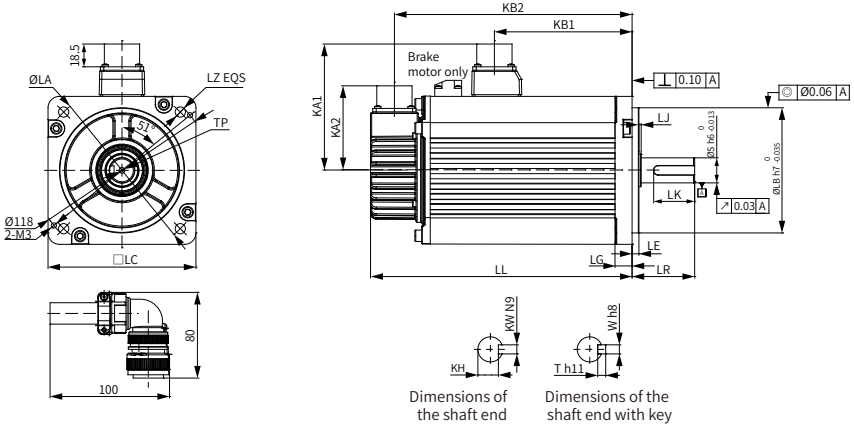
■ Heatsink-based derating curve



■ Allowable load

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

■ Dimensions



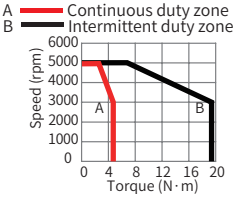
LL	LC	LE	LA	LZ	KA1	KA2	LJ	KB1	KB2
214	100	5±0.3	115	4-Ø7	88	74	2.5±0.75	144.5	193.5

LR	S	LB	TP	LK	KH	kW	W	T	LG	Weight (kg)
45±1	24	95	M8×16	36	$20^{0}_{-0.2}$	8	8	7	10	7.39

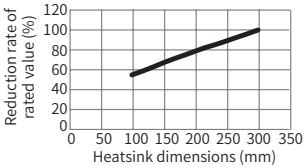
2.3.6 MS1H2-20C30CD-*334Z-S4

Motor specifications	
Flange size (mm)	100
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	2
Voltage (V)	380
Rated torque (N·m)	6.36
Maximum torque (N·m)	19.1
Continuous current (Arms)	5.89
Maximum current (Arms)	20
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.19
Rotor moment of inertia ($kg \cdot cm^2$)	4.31

■ Torque-Speed characteristics



■ Heatsink-based derating curve



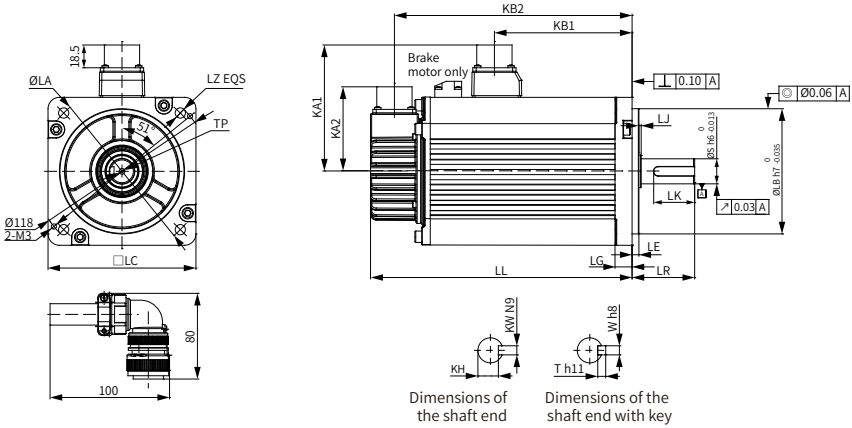
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	23	25	0.96	⩽ 85	⩽ 30	⩽ 0.5

■ Allowable load

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

■ Dimensions

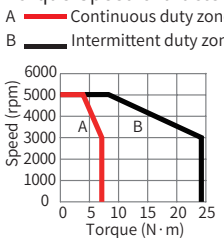


LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
265	100	5±0.3	115	4-Ø7	88	74	8	10	153	244	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
45±1		24	95	M8×16	36	$20^{0}_{-0.2}$	2.5±0.75		8	7	8.7

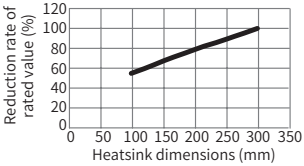
2.3.7 MS1H2-25C30CD-*331Z

Motor specifications	
Flange size (mm)	100
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	2.5
Voltage (V)	380
Rated torque (N·m)	7.96
Maximum torque (N·m)	23.9
Continuous current (Arms)	7.56
Maximum current (Arms)	25
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.2
Rotor moment of inertia (kg·cm^2)	3.65

■ Torque-Speed characteristics



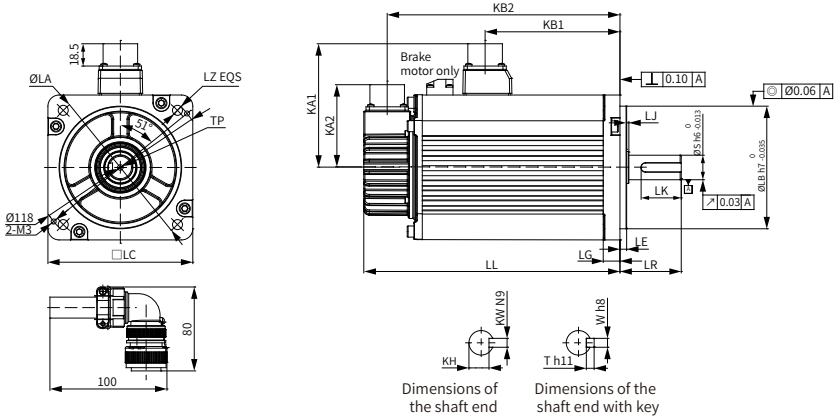
■ Heatsink-based derating curve



■ Allowable load

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

■ Dimensions



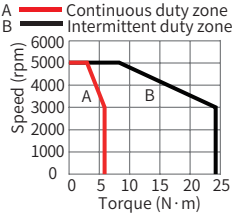
LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2
240.5	100	5±0.3	115	4-Ø7	88	74	8	10	169.5	218.5

LR	S	LB	TP	LK	KH	LJ	W	T	Weight (kg)
45±1	24	95	M8×16	36	$20^{0}_{-0.2}$	2.5±0.75	8	7	8.55

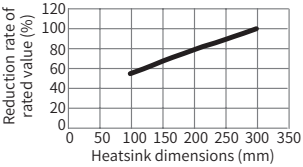
2.3.8 MS1H2-25C30CD-*334Z-S4

Motor specifications	
Flange size (mm)	100
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	2.5
Voltage (V)	380
Rated torque (N·m)	7.96
Maximum torque (N·m)	23.9
Continuous current (Arms)	7.56
Maximum current (Arms)	25
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.2
Rotor moment of inertia ($kg \cdot cm^2$)	4.9

■ Torque-Speed characteristics



■ Heatsink-based derating curve



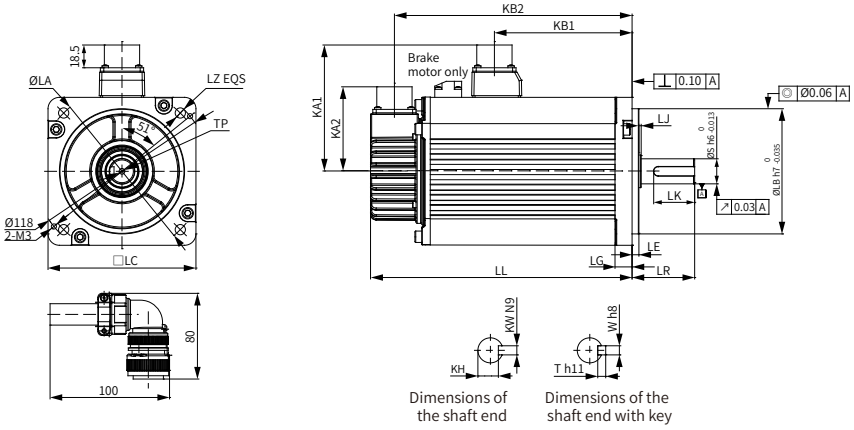
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
8	24	23	25	0.96	⩽ 85	⩽ 30	⩽ 0.5

■ Allowable load

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

■ Dimensions



Dimensions of the shaft end

Dimensions of the shaft end with key

LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
290	100	5±0.3	115	4-Ø7	88	74	8	10	178	269	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
45±1		24	95	M8×16	36	$20^{0}_{-0.2}$	2.5±0.75		8	7	9.8

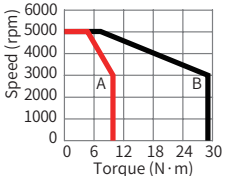
2.3.9 MS1H2-30C30CD-*331Z

Motor specifications	
Flange size (mm)	130
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	3
Voltage (V)	380
Rated torque (N·m)	9.8
Maximum torque (N·m)	29.4
Continuous current (Arms)	10
Maximum current (Arms)	30
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.2
Rotor moment of inertia (kg·cm^2)	7.72

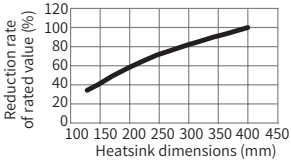
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



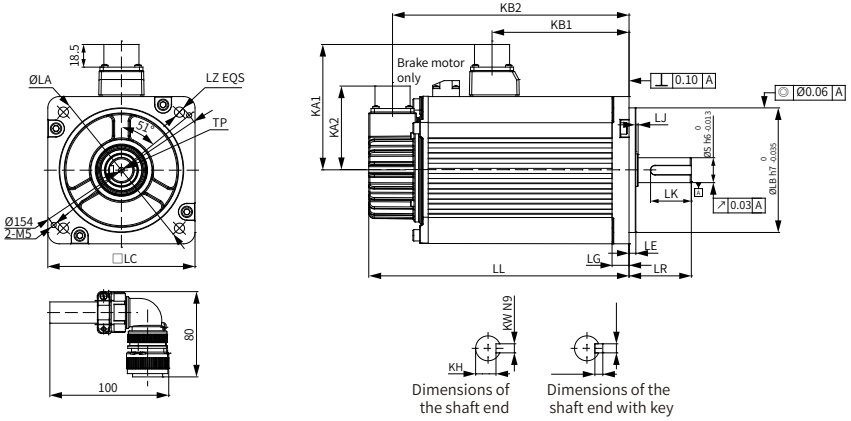
■ Heatsink-based derating curve



■ Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	980	392

■ Dimensions



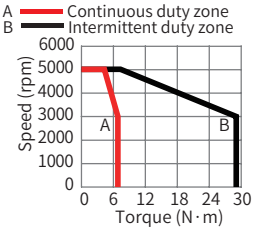
LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2
209.5	130	6±0.3	145	4-Ø9	103	74	8	14	136	188.5

LR	S	LB	TP	LK	KH	LJ	W	T	Weight (kg)
63±1	28	110	M8×20	54	$24^{0}_{-0.2}$	0.5±0.75	8	7	10.73

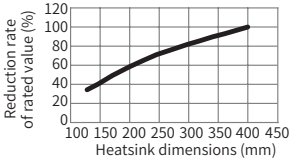
2.3.10 MS1H2-30C30CD-*334Z-S4

Motor specifications	
Flange size (mm)	130
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	3
Voltage (V)	380
Rated torque (N·m)	9.8
Maximum torque (N·m)	29.4
Continuous current (Arms)	10
Maximum current (Arms)	30
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.2
Rotor moment of inertia ($kg \cdot cm^2$)	10.22

■ Torque-Speed characteristics



■ Heatsink-based derating curve



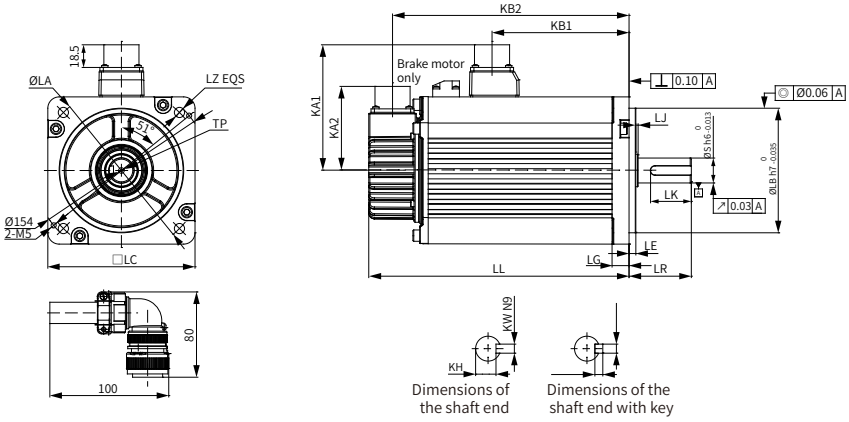
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	27	21.3	1.13	⩽ 100	⩽ 60	⩽ 0.5

■ Allowable load

LF (mm)	Allowable radial load (N)	Allowable axial load (N)
63	980	392

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
265.5	130	6±0.3	145	4-Ø9	103	74	8	14	139	244.5	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
63±1		28	110	M8×20	54	24 $^{0}_{-0.2}$	0.5±0.75		8	7	13.2

2.3.11 MS1H2-40C30CD-*331Z

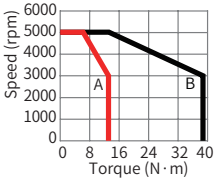
Motor specifications	
Flange size (mm)	130
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	4
Voltage (V)	380
Rated torque (N·m)	12.6
Maximum torque (N·m)	37.8
Continuous current (Arms)	13.6
Maximum current (Arms)	40.8
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.12
Rotor moment of inertia (kg·cm^2)	12.1

■ Allowable load

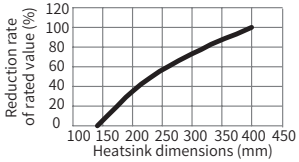
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone

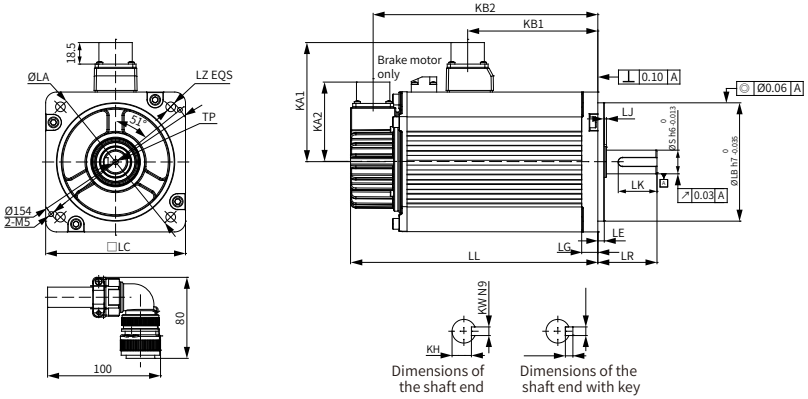


■ Heatsink-based derating curve



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

■ Dimensions

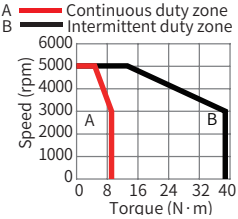


LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
252	130	6±0.3	145	4-Ø9	103	74	8	14	178.5	231	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
63±1		28	110	M8×20	54	$24^{\ 0}_{-0.2}$	0.5±0.75		8	7	15.43

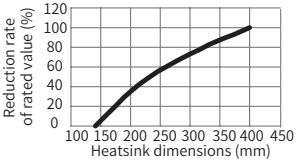
2.3.12 MS1H2-40C30CD-*334Z-S4

Motor specifications	
Flange size (mm)	130
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	4
Voltage (V)	380
Rated torque (N·m)	12.6
Maximum torque (N·m)	37.8
Continuous current (Arms)	13.6
Maximum current (Arms)	40.8
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.12
Rotor moment of inertia (kg·cm^2)	14.6

■ Torque-Speed characteristics



■ Heatsink-based derating curve



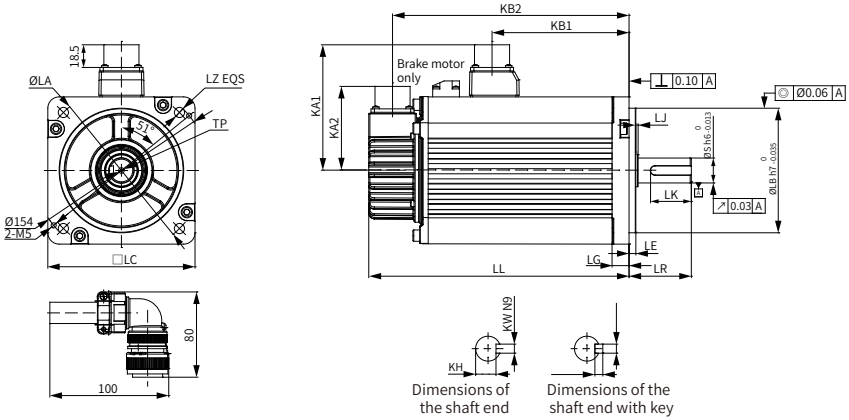
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	27	21.3	1.13	⩽ 100	⩽ 60	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
308	130	6±0.3	145	4-Ø9	103	74	8	14	181.5	287	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
63±1		28	110	M8×20	54	24 $^{0}_{-0.2}$	0.5±0.75		8	7	17.9

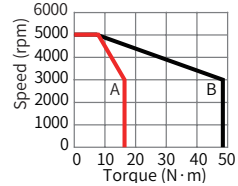
2.3.13 MS1H2-50C30CD-*331Z

Motor specifications	
Flange size (mm)	130
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	5
Voltage (V)	380
Rated torque (N·m)	15.8
Maximum torque (N·m)	47.4
Continuous current (Arms)	16
Maximum current (Arms)	48
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.29
Rotor moment of inertia (kg·cm^2)	15.4

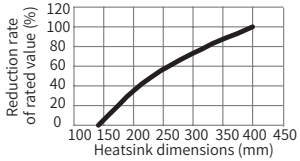
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



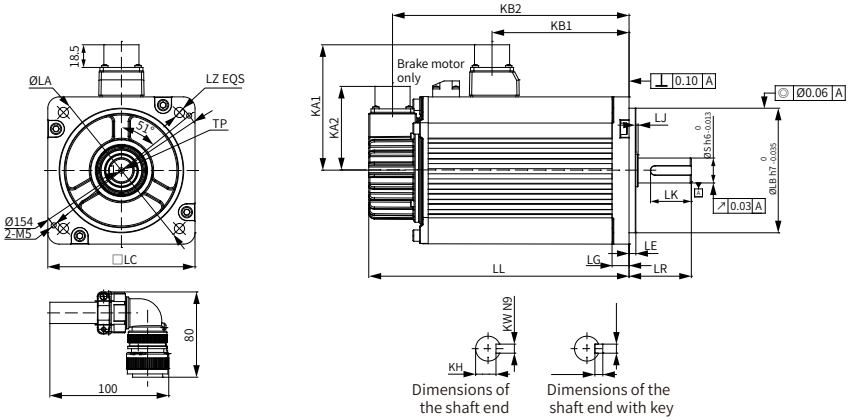
■ Heatsink-based derating curve



■ Allowable load

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

■ Dimensions

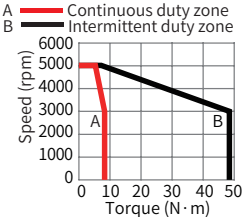


LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
294.5	130	6±0.3	145	4-Ø9	103	74	8	14	221	273.5	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
63±1		28	110	M8×20	54	$24^{0}_{-0.2}$	0.5±0.75		8	7	16.2

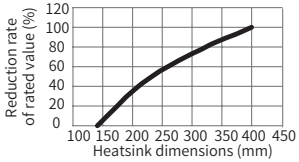
2.3.14 MS1H2-50C30CD-*334Z-S4

Motor specifications	
Flange size (mm)	130
Inertia, capacity	Low inertia, medium capacity
Rated output (kW)	5
Voltage (V)	380
Rated torque (N·m)	15.8
Maximum torque (N·m)	47.4
Continuous current (Arms)	16
Maximum current (Arms)	48
Rated speed (rpm)	3000
Maximum speed (rpm)	5000
Torque coefficient (N·m/Arms)	1.29
Rotor moment of inertia (kg·cm^2)	17.9

■ Torque-Speed characteristics



■ Heatsink-based derating curve



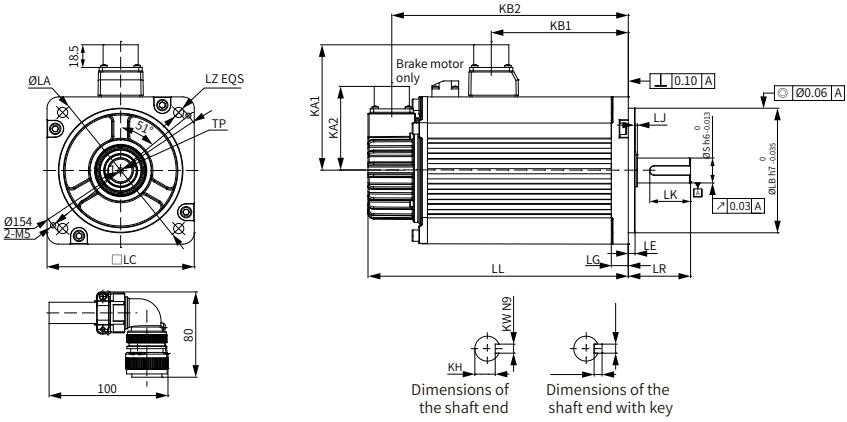
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
16	24	27	21.3	1.13	⩽ 100	⩽ 60	⩽ 0.5

■ Allowable load

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

■ Dimensions



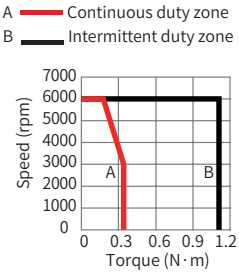
LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
350.5	130	6±0.3	145	4-Ø9	103	74	8	14	224	329.5	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
63±1		28	110	M8×20	54	$24^{0}_{-0.2}$	0.5±0.75		8	7	18.4

2.4 MS1H4 Motors with Medium Inertia and Small Capacity

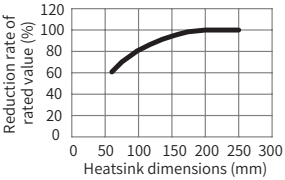
2.4.1 MS1H4-10B30CB-*33*Z

Motor specifications		
Flange size (mm)	40	
Inertia, capacity	Low inertia, small capacity	
Rated output (kW)	0.1	
Voltage (V)	220	
Rated torque (N·m)	0.32	
Maximum torque (N·m)	1.12	
Continuous current (Arms)	1.3	
Maximum current (Arms)	4.70	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.26	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	0.102
	Brake motor	0.104

■ Torque-Speed characteristics



■ Heatsink-based derating curve



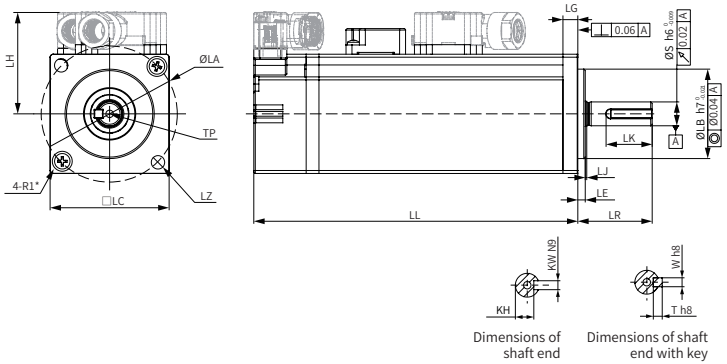
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
0.32	24	6.1	94.4	0.25	⩽ 40	⩽ 20	⩽ 1.5

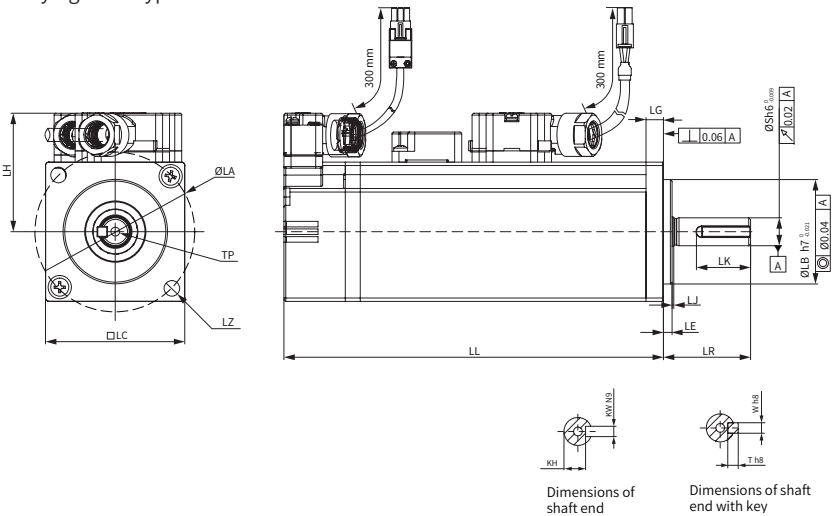
■ Allowable load

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

■ Terminal-type motors



■ Flying leads type motors



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
89.9(120.5)	40	25±0.5	46	2-Ø4.5	34	5	2.5±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
8	30	M3×6	16	$6.2^{\ 0}_{-0.1}$	3	3	3	0.45(0.64)

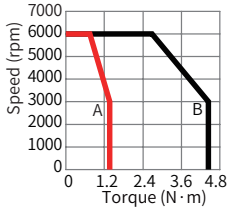
2.4.2 MS1H4-40B30CB-*33*Z(-S)

Motor specifications		
Flange size (mm)	60	
Inertia, capacity	Medium inertia, small capacity	
Rated output (kW)	0.4	
Voltage (V)	220	
Rated torque (N·m)	1.27	
Maximum torque (N·m)	4.46	
Continuous current (Arms)	2.8	
Maximum current (Arms)	10.1	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.53	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	0.657
	Brake motor	0.667

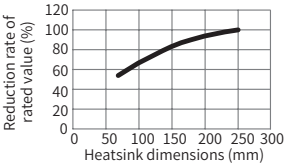
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



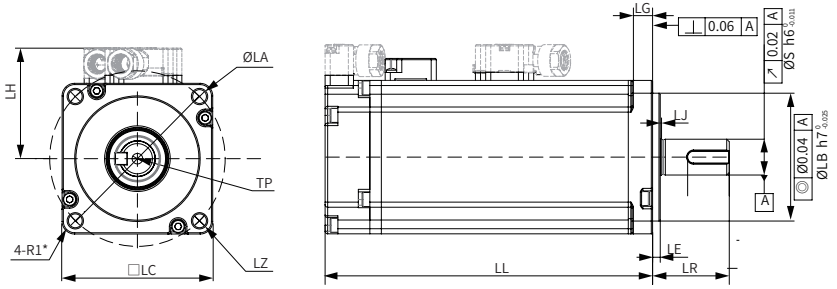
■ Electrical specifications of the brake

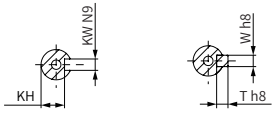
Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
1.5	24	7.6	75.79	0.32	⩽ 60	⩽ 20	⩽ 1.5

■ Allowable load

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

■ Terminal-type motors

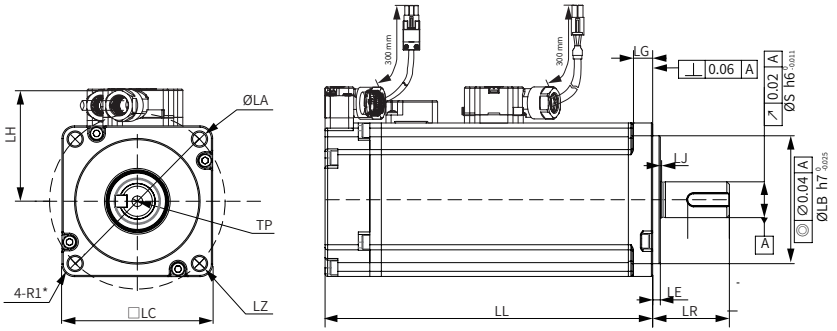


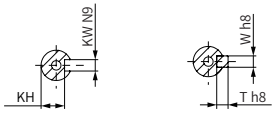


Dimensions of the shaft end

Dimensions of the shaft with key

■ Flying leads type motors





Dimensions of the shaft end

Dimensions of the shaft end with key

LL	LC	LR	LA	LZ	LH	LG	LE	LJ
105(128)	60	30±0.5	70	4-Ø5.5	44	7.5	3±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
14	50	M5×8	17.5	11 $^{0}_{-0.1}$	5	5	5	1.27(1.62)

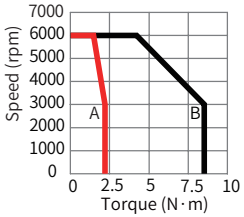
2.4.3 MS1H4-75B30CB-*33*Z(-S)

Motor specifications		
Flange size (mm)	80	
Inertia, capacity	Medium inertia, small capacity	
Rated output (kW)	0.75	
Voltage (V)	220	
Rated torque (N·m)	2.39	
Maximum torque (N·m)	8.36	
Continuous current (Arms)	4.8	
Maximum current (Arms)	16.9	
Rated speed (rpm)	3000	
Maximum speed (rpm)	6000	
Torque coefficient (N·m/Arms)	0.58	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	2
	Brake motor	2.012

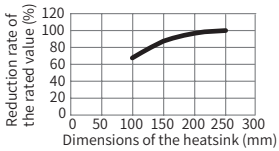
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



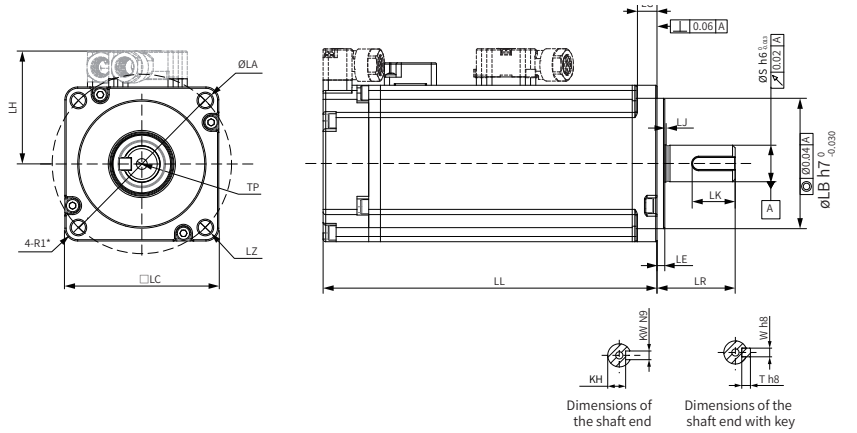
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage ±10% (VDC)	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
3.2	24	10	57.6	0.42	⩽ 60	⩽ 40	⩽ 1.0

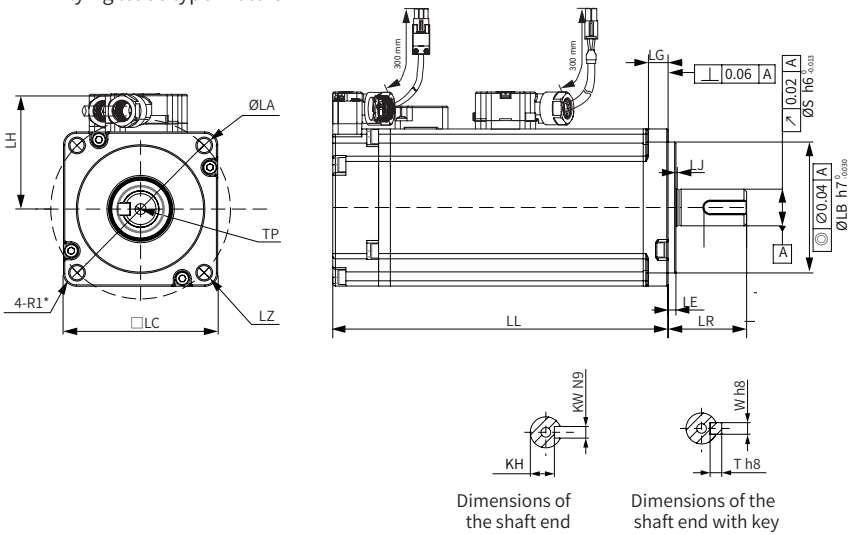
■ Allowable load

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

■ Terminal-type motors



■ Flying leads type motors



LL	LC	LR	LA	LZ	LH	LG	LE	LJ
117.5(147.5)	80	35±0.5	90	4-Ø7	54	7.7	3±0.5	0.5±0.35
S	LB	TP	LK	KH	kW	W	T	Weight (kg)
19	70	M6x20	26	15.5 $^{0}_{0.1}$	6	6	6	2.40(3.04)

2.5 MS1H3 Motor with Medium Inertia and Medium Capacity

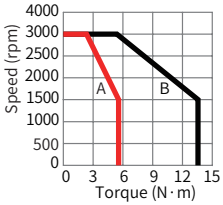
2.5.1 MS1H3-85B15CB-*33*Z

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	0.85	
Voltage (V)	220	
Rated torque (N·m)	5.39	
Maximum torque (N·m)	13.5	
Continuous current (Arms)	6.6	
Maximum current (Arms)	16.5	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	0.95	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	13.3
	Brake motor	14

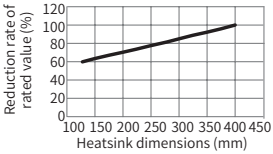
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



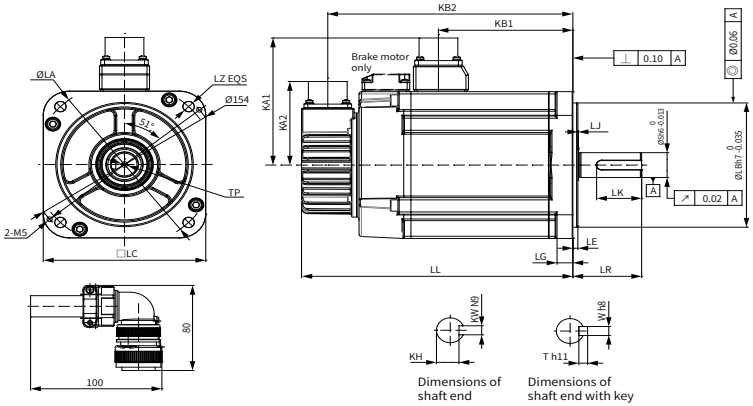
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
12	24	19.4	29.7	0.81	⩽ 120	⩽ 60	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KB1	KA2	KB2	LG	kW	
146(182)	130	4	145	4-Ø9	103	72.5	74	125(161)	14	8	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
55±1		22	110	M6x20	36	$18^{0}_{-0.2}$	0.5±0.75		8	7	7(8)

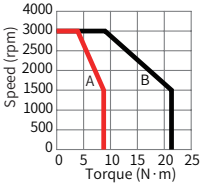
2.5.2 MS1H3-13C15CB-*33*Z

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	1.3	
Voltage (V)	220	
Rated torque (N·m)	8.34	
Maximum torque (N·m)	20.85	
Continuous current (Arms)	10	
Maximum current (Arms)	25	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	0.95	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	17.8
	Brake motor	18.5

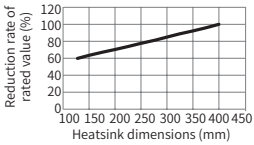
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



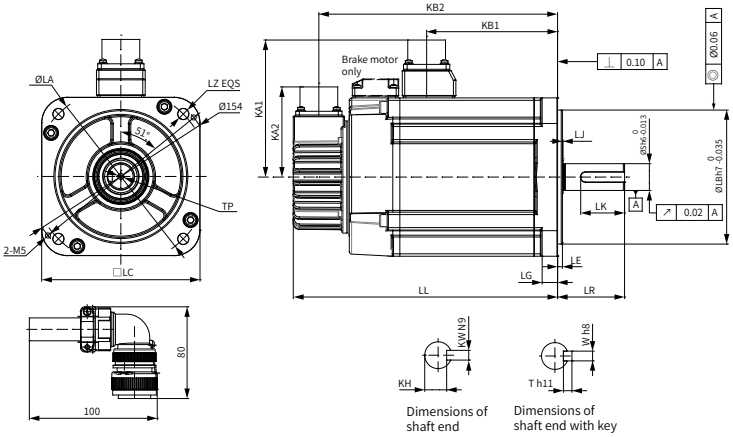
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
12	24	19.4	29.7	0.81	⩽ 120	⩽ 60	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KB1	KA2	KB2	LG	kW	
163(199)	130	4	145	4-Ø9	103	89.5	74	142(178)	14	8	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
55±1		22	110	M6x20	36	$18^{0}_{-0.2}$	0.5±0.75		8	7	8(9.5)

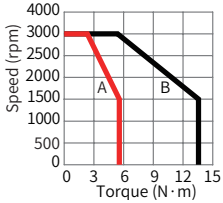
2.5.3 MS1H3-85B15CD-*33*Z

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	0.85	
Voltage (V)	380	
Rated torque (N·m)	5.39	
Maximum torque (N·m)	13.5	
Continuous current (Arms)	3.3	
Maximum current (Arms)	8.25	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.87	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	13.3
	Brake motor	14

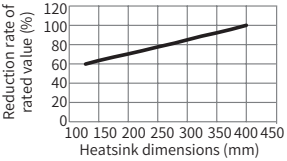
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



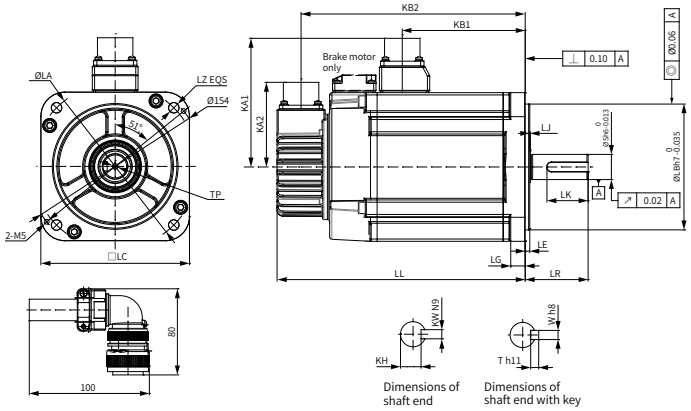
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
12	24	19.4	29.7	0.81	⩽ 120	⩽ 60	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KB1	KA2	KB2	LG	kW	
146(182)	130	4	145	4-Ø9	103	72.5	74	125(161)	14	8	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
55±1		22	110	M6x20	36	$18^{0}_{-0.2}$	0.5±0.75		8	7	7(8)

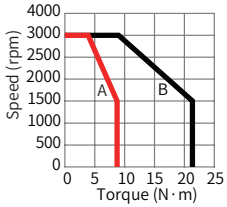
2.5.4 MS1H3-13C15CD-*33*Z

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	1.3	
Voltage (V)	380	
Rated torque (N·m)	8.34	
Maximum torque (N·m)	20.85	
Continuous current (Arms)	5	
Maximum current (Arms)	12.5	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.87	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	17.8
	Brake motor	18.5

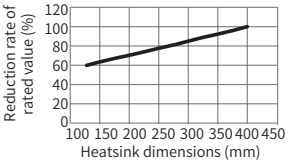
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



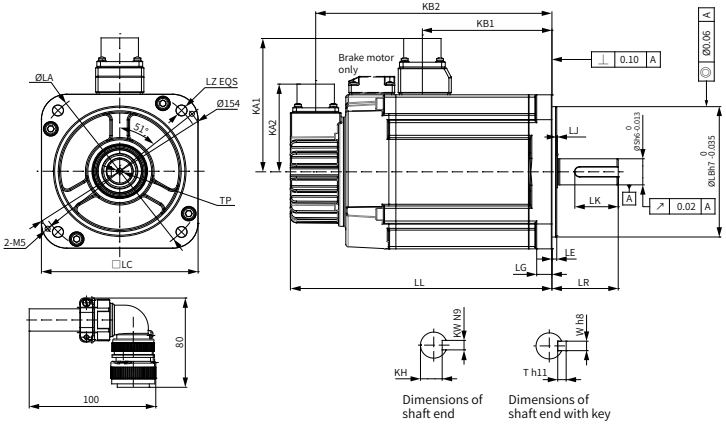
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
12	24	19.4	29.7	0.81	⩽ 120	⩽ 60	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KB1	KA2	KB2	LG	kW	
163(199)	130	4	145	4-Ø9	103	89.5	74	142(178)	14	8	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
55±1		22	110	M6x20	36	$18^{0}_{-0.2}$	0.5±0.75		8	7	8(9.5)

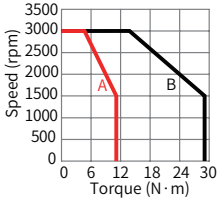
2.5.5 MS1H3-18C15CD-*33*Z

Motor specifications		
Flange size (mm)	130	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	1.8	
Voltage (V)	380	
Rated torque (N·m)	11.5	
Maximum torque (N·m)	28.75	
Continuous current (Arms)	6.6	
Maximum current (Arms)	16.5	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.87	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	25
	Brake motor	25.7

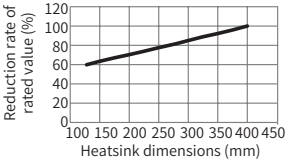
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



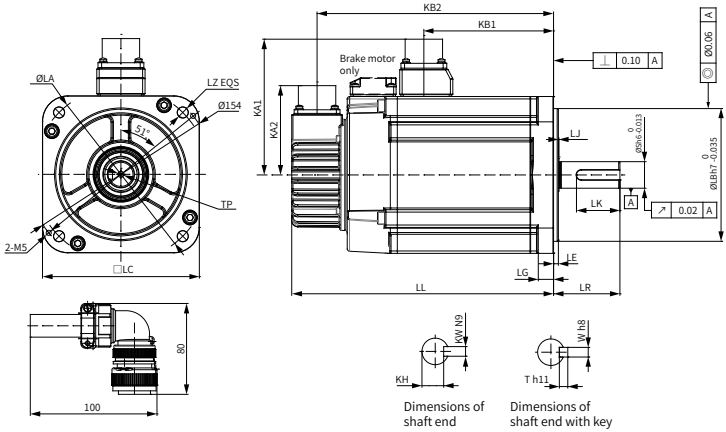
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
12	24	19.4	29.7	0.81	⩽ 120	⩽ 60	⩽ 0.5

■ Allowable load

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

■ Dimensions

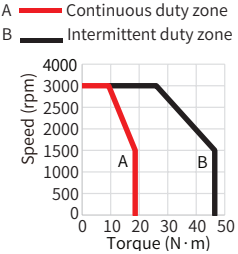


LL	LC	LE	LA	LZ	KA1	KB1	KA2	KB2	LG	kW	
181(217)	130	4	145	4-Ø9	103	107.5	74	160(196)	14	8	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
55±1		22	110	M6x20	36	$18^{0}_{-0.2}$	0.5±0.75		8	7	9.5(11)

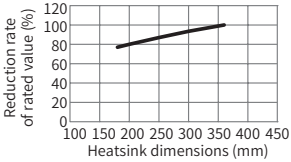
2.5.6 MS1H3-29C15CD-*33*Z

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	2.9	
Voltage (V)	380	
Rated torque (N·m)	18.6	
Maximum torque (N·m)	46.5	
Continuous current (Arms)	11.9	
Maximum current (Arms)	29.75	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.82	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	55
	Brake motor	57.2

■ Torque-Speed characteristics



■ Heatsink-based derating curve



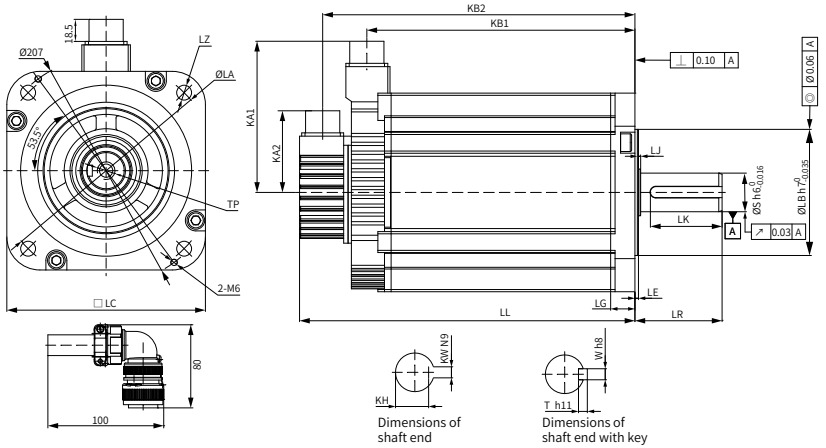
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	40	14.4	1.67	⩽ 200	⩽ 100	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
197(273)	180	3.2±0.3	200	4-Ø13.5	138	74	10	18	136(134)	177(253)	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
79±1		35	114.3	M12×25	65	$30^{0}_{-0.2}$	0.3±0.75		10	8	15(25)

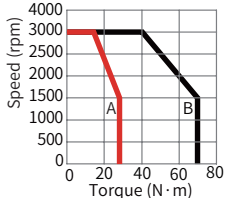
2.5.7 MS1H3-44C15CD-*33*Z

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	4.4	
Voltage (V)	380	
Rated torque (N·m)	28.4	
Maximum torque (N·m)	71.1	
Continuous current (Arms)	16.5	
Maximum current (Arms)	40.5	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.9	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	88.9
	Brake motor	90.8

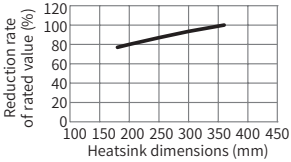
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



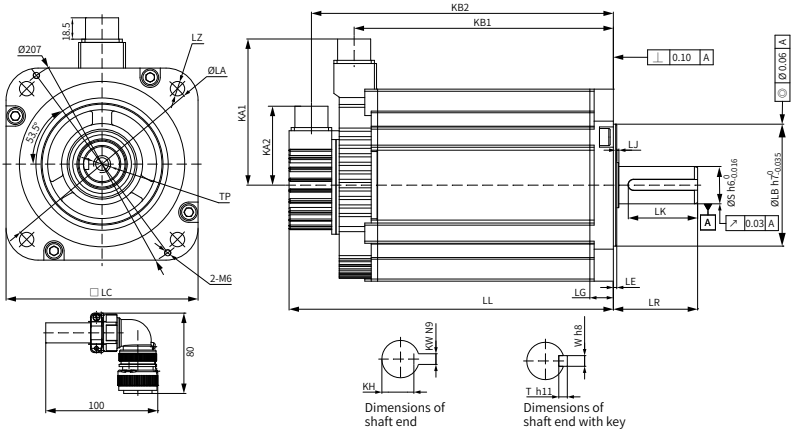
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	40	14.4	1.67	⩽ 200	⩽ 100	⩽ 0.5

■ Allowable load

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

■ Dimensions

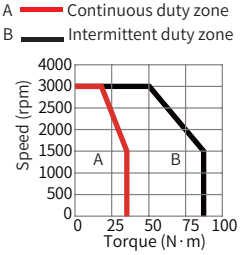


LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
230(307)	180	3.2±0.3	200	4-Ø13.5	138	74	10	18	169(167)	210(286)	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
79±1		35	114.3	M12×25	65	$30^{0}_{-0.2}$	0.3±0.75		10	8	19.5(30)

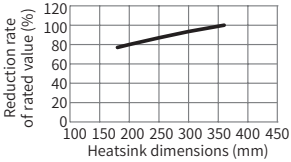
2.5.8 MS1H3-55C15CD-*33*Z

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	5.5	
Voltage (V)	380	
Rated torque (N·m)	35	
Maximum torque (N·m)	87.6	
Continuous current (Arms)	20.85	
Maximum current (Arms)	52	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.74	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	107
	Brake motor	109.5

■ Torque-Speed characteristics



■ Heatsink-based derating curve



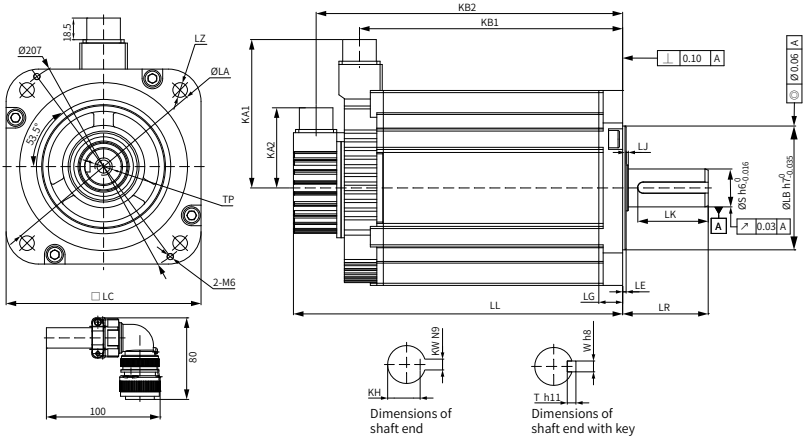
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	40	14.4	1.67	⩽ 200	⩽ 100	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
274(350)	180	3.2±0.3	200	4-Ø13.5	138	74	12	18	213(211)	254(330)	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
113±1		42	114.3	M16×32	97	$37^{\ 0}_{-0.2}$	0.3±0.75		12	8	28(38)

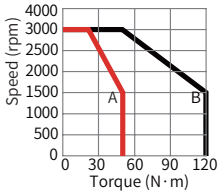
2.5.9 MS1H3-75C15CD-*33*Z

Motor specifications		
Flange size (mm)	180	
Inertia, capacity	Medium inertia, medium capacity	
Rated output (kW)	7.5	
Voltage (V)	380	
Rated torque (N·m)	48	
Maximum torque (N·m)	119	
Continuous current (Arms)	25.7	
Maximum current (Arms)	65	
Rated speed (rpm)	1500	
Maximum speed (rpm)	3000	
Torque coefficient (N·m/Arms)	1.99	
Rotor moment of inertia ($kg \cdot cm^2$)	Brake-less motor	141
	Brake motor	143.1

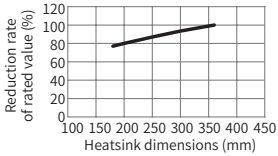
■ Torque-Speed characteristics

A Continuous duty zone

B Intermittent duty zone



■ Heatsink-based derating curve



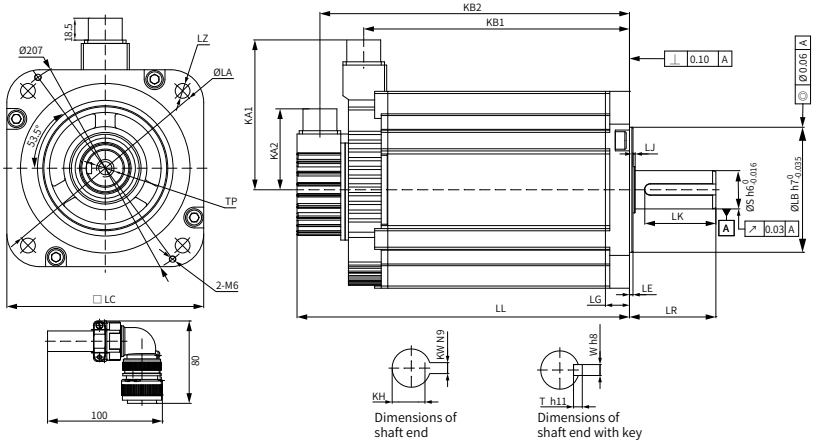
■ Electrical specifications of the brake

Holding torque (N·m)	Supply voltage (VDC) ±10%	Rated power (W)	Coil resistance (Ω) (±7%)	Exciting current (A)	Apply time (ms)	Release time (ms)	Backlash (°)
50	24	40	14.4	1.67	⩽ 200	⩽ 100	⩽ 0.5

■ Allowable load

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

■ Dimensions



LL	LC	LE	LA	LZ	KA1	KA2	kW	LG	KB1	KB2	
330(407)	180	3.2±0.3	200	4-Ø13.5	138	74	12	18	269(267)	310(386)	
LR		S	LB	TP	LK	KH	LJ		W	T	Weight (kg)
113±1		42	114.3	M16×32	97	$37^{0}_{-0.2}$	0.3±0.75		12	8	32(42)

3. Cables

3.1 Cable Models

3.1.1 Encoder Cables

S6–L–P 0 0 0–3.0–T
① ②③④ ⑤ ⑥

① Cable type S6-L-P: Encoder cable	④ Connector type at motor side 0: AMP 1: 9-core aviation connector 2: 6-core aviation connector/ Chogori aviation connector 4: Middle series 4-core connector 5: Middle series 6-core connector	⑤ Cable length 3.0: 3 m 5.0: 5 m 10.0: 10 m
② Connector type at drive side 0: DB9 1: USB		
③ Encoder 0: Wire-saving encoder/2500-PPR encoder 1: Communication-type incremental encoder 2: Communication-type multi-turn absolute encoder		⑥ Special requirements Blank: Regular cables T: Flexible cables TS: Shielded flexible cable

Figure 3-1 Description of encoder cable model

3.1.2 Power Cables

S6–L–M 0 0 0–3.0–T
① ②③④ ⑤ ⑥

① Cable type S6-L-M: Brake-less power cable S6-L-B: Brake power cable	④ Connector type at motor side 0: AMP 1: 9-core aviation connector 2: 6-core aviation connector 4: Middle series 4-core connector 5: Middle series 6-core connector 6: SM-PW series 6-core connector 7: SDC-06T series aviation connector (front outlet) 8: SDC-06T series aviation connector (rear outlet)	⑤ Cable length 3.0: 3 m 5.0: 5 m 10.0: 10 m
② Connector type at drive side 0: U-shaped cable lug 1: Needle-shaped cable lug		
③ Conductor specifications 0: 18AWG/20AWG 1: 14AWG 2: 12AWG		⑥ Special requirements Blank: Regular cables T: Flexible cables TS: Shielded flexible cable

Figure 3-2 Description of power cables

NOTE

- Cable models ending with "-T" are flexible cables fit for cable carriers. For example, model "S6-L-P120-**" represents regular cables; model "S6-L-P120-**-T" represents flexible cables.
- Cable models ending with "-TS" are shielded flexible cables. Inovance encoder cables are shielded cables.

3.2 Cable Categories

■ Fixed cables

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

■ Flexible cables

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

NOTE

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

■ Oil-resistant cables

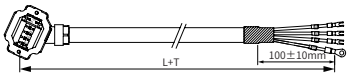
Oil-resistant cables apply to applications requiring shielded power cables, such as machine tools, cutting fluids, and cutting compounds.

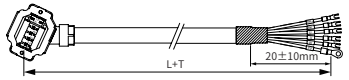
NOTE

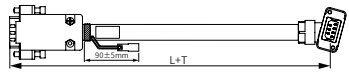
- S6-C24 cable kit is required for terminal-type motor encoder cables longer than 25 m. Contact Inovance sales staff for details on the cable length.
- Contact Inovance sales staff for flying leads type motor encoder cables longer than 25 m.

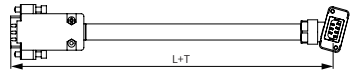
3.3 Selection of Cables and Options

3.3.1 Cables for IS620

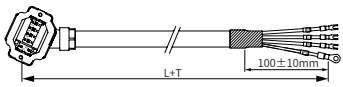
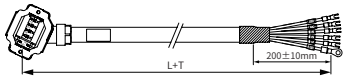
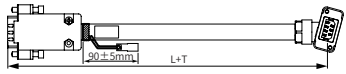
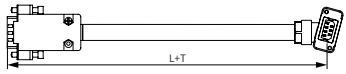
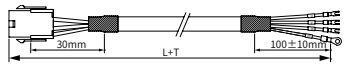
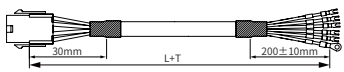
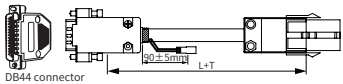
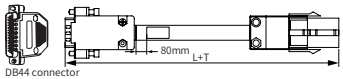
<table>
<tr><th>Motor Model</th><th>Flange size</th><th colspan="2">Cable name</th><th>Cable model</th><th>Cable length (mm)</th><th>Tolerance (mm)</th><th>Drawing</th></tr>
<tr><td rowspan="12">MS1H1
MS1H4
Terminal-type motors</td><td rowspan="12">40
60
80</td><td rowspan="12">Front outlet</td><td rowspan="3">Power cable (brake-less)</td><td>S6-L-M007-3.0</td><td>3000</td><td>(-30,30)</td><td rowspan="3"> 

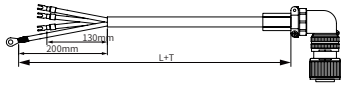
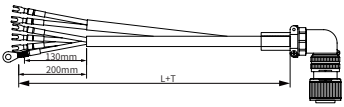
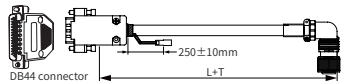
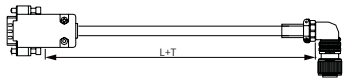
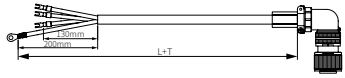
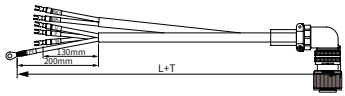
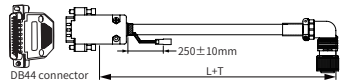
<table>
<tr><th>Outer diameter of the sheath (regular cable)</th><th>Outer diameter of the sheath (flexible cable)</th><th>Outer diameter of the sheath (shielded flexible cable)</th></tr>
<tr><td>6.5 mm</td><td>6.5 mm</td><td>6.5 mm</td></tr>
</table></td></tr>
<tr><td>S6-L-M007-5.0</td><td>5000</td><td>(-30,50)</td></tr>
<tr><td>S6-L-M007-10.0</td><td>10000</td><td>(-30,80)</td></tr>
<tr><td rowspan="3">Power cable (with brake)</td><td>S6-L-B007-3.0</td><td>3000</td><td>(-30,30)</td><td rowspan="3"> 

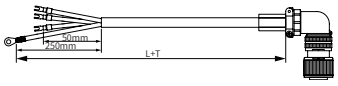
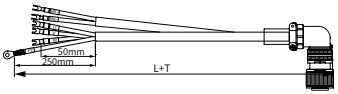
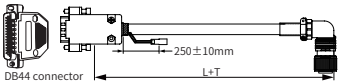
<table>
<tr><th>Outer diameter of the sheath (regular cable)</th><th>Outer diameter of the sheath (flexible cable)</th><th>Outer diameter of the sheath (shielded flexible cable)</th></tr>
<tr><td>6.5 mm</td><td>6.5 mm</td><td>6.5 mm</td></tr>
</table></td></tr>
<tr><td>S6-L-B007-5.0</td><td>5000</td><td>(-30,50)</td></tr>
<tr><td>S6-L-B007-10.0</td><td>10000</td><td>(-30,80)</td></tr>
<tr><td rowspan="3">23-bit absolute encoder cable</td><td>S6-L-P024-3.0</td><td>3000</td><td>(-30,30)</td><td rowspan="3"> 

The outer diameter of the sheath is 6.0 mm.</td></tr>
<tr><td>S6-L-P024-5.0</td><td>5000</td><td>(-30,50)</td></tr>
<tr><td>S6-L-P024-10.0</td><td>10000</td><td>(-30,80)</td></tr>
<tr><td rowspan="3">Incremental encoder cable</td><td>S6-L-P014-3.0</td><td>3000</td><td>(-30,30)</td><td rowspan="3"> 

The outer diameter of the sheath is 6.0 mm.</td></tr>
<tr><td>S6-L-P014-5.0</td><td>5000</td><td>(-30,50)</td></tr>
<tr><td>S6-L-P014-10.0</td><td>10000</td><td>(-30,80)</td></tr>
</table>

Motor Model	Flange size	Cable name		Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H1 MS1H4 Terminal-type motors	40 60 80	Rear outlet	Power cable (brake-less)	S6-L-M008-3.0	3000	(-30,30)	
				S6-L-M008-5.0	5000	(-30,50)	
				S6-L-M008-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			Power cable (with brake)	S6-L-B008-3.0	3000	(-30,30)	
				S6-L-B008-5.0	5000	(-30,50)	
				S6-L-B008-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			23-bit absolute encoder cable	S6-L-P025-3.0	3000	(-30,30)	
				S6-L-P025-5.0	5000	(-30,50)	
				S6-L-P025-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
			Incremental encoder cable	S6-L-P015-3.0	3000	(-30,30)	
				S6-L-P015-5.0	5000	(-30,50)	
				S6-L-P015-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H1 MS1H4 flying leads type motors	40 60 80	Power cable (brake-less)		S6-L-M00-3.0	3000	(-30,30)	
				S6-L-M00-5.0	5000	(-30,50)	
				S6-L-M00-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		Power cable (with brake)		S6-L-B00-3.0	3000	(-30,30)	
				S6-L-B00-5.0	5000	(-30,50)	
				S6-L-B00-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		23-bit absolute encoder cable		S6-L-P20-3.0	3000	(-30,30)	
				S6-L-P20-5.0	5000	(-30,50)	
				S6-L-P20-10.0	10000	(-30,80)	DB44 connector The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable		S6-L-P00-3.0	3000	(-30,30)	
				S6-L-P00-5.0	5000	(-30,50)	
				S6-L-P00-10.0	10000	(-30,80)	DB44 connector The outer diameter of the sheath is 6.0 mm.

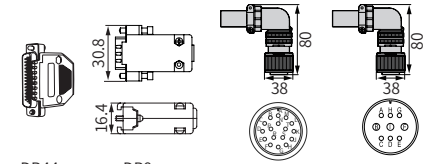
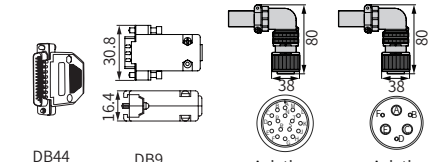
Motor Model	Flange size	Cable name	Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H2 MS1H3 Aviation connector-type motors	100 130	Power cable (brake-less)	S6-L-M11-3.0	3000	(-30,30)	
			S6-L-M11-5.0	5000	(-30,50)	
			S6-L-M11-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		Power cable (with brake)	S6-L-B11-3.0	3000	(-30,30)	
			S6-L-B11-5.0	5000	(-30,50)	
			S6-L-B11-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		23-bit absolute encoder cable	S6-L-P21-3.0	3000	(-30,30)	
			S6-L-P21-5.0	5000	(-30,50)	
			S6-L-P21-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P01-3.0	3000	(-30,30)	
			S6-L-P01-5.0	5000	(-30,50)	
			S6-L-P01-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H3 aviation connector-type motors (2.9 kW)	180	Power cable (brake-less)	S6-L-M12-3.0	3000	(-30,30)	
			S6-L-M12-5.0	5000	(-30,50)	
			S6-L-M12-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		Power cable (with brake)	S6-L-B12-3.0	3000	(-30,30)	
			S6-L-B12-5.0	5000	(-30,50)	
			S6-L-B12-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		23-bit absolute encoder cable	S6-L-P21-3.0	3000	(-30,30)	
			S6-L-P21-5.0	5000	(-30,50)	
			S6-L-P21-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P01-3.0	3000	(-30,30)	
			S6-L-P01-5.0	5000	(-30,50)	
			S6-L-P01-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.

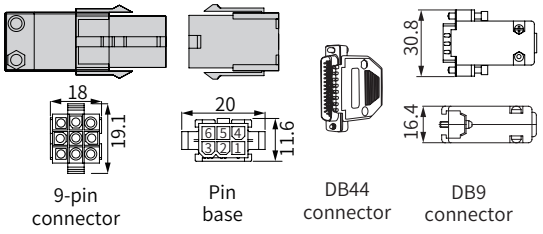
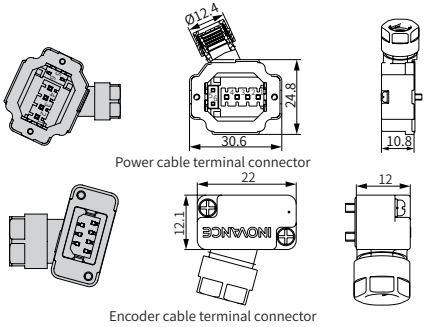
Motor Model	Flange size	Cable name	Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H3 aviation connector-type motors (4.4 kW and above)	180	Power cable (brake-less)	S6-L-M22-3.0	3000	(-30,30)	
			S6-L-M22-5.0	5000	(-30,50)	
			S6-L-M22-10.0	10000	(-30,80)	
		Power cable (with brake)	S6-L-B22-3.0	3000	(-30,30)	
			S6-L-B22-5.0	5000	(-30,50)	
			S6-L-B22-10.0	10000	(-30,80)	
		23-bit absolute encoder cable	S6-L-P21-3.0	3000	(-30,30)	
			S6-L-P21-5.0	5000	(-30,50)	
			S6-L-P21-10.0	10000	(-30,80)	
		Incremental encoder cable	S6-L-P01-3.0	3000	(-30,30)	
			S6-L-P01-5.0	5000	(-30,50)	
			S6-L-P01-10.0	10000	(-30,80)	

Outer diameter of the sheath (regular cable)	Outer diameter of the sheath (flexible cable)	Outer diameter of the sheath (shielded flexible cable)
12.2 mm	12.5 mm	13.2 mm

The outer diameter of the sheath is 6.0 mm.

The outer diameter of the sheath is 6.0 mm.

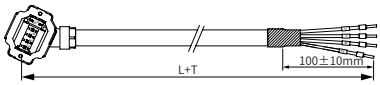
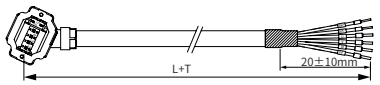
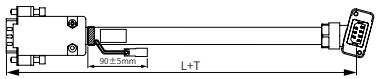
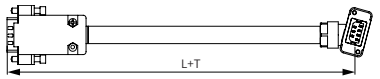
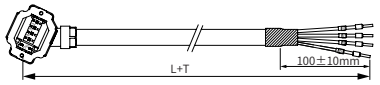
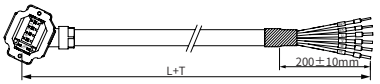
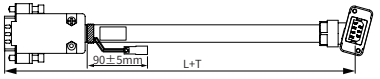
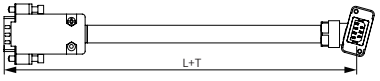
Applicable motor model	Connectors	Drawing and dimensions
MS1H2 MS1H3/MS1V3 (1.8 kW and below)	S6-C2	 DB44 connector DB9 connector Aviation connector 3108E20-29S Aviation connector 3108E20-18S
MS1H3 (2.9 kW and above)	S6-C3	 DB44 connector DB9 connector Aviation connector 3108E20-29S Aviation connector 3108E20-22S

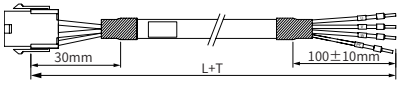
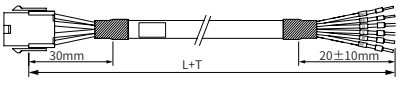
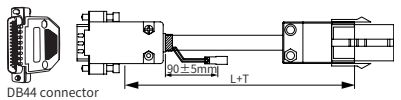
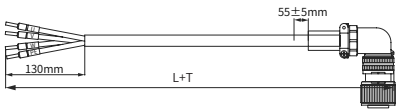
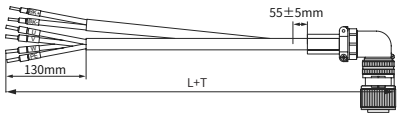
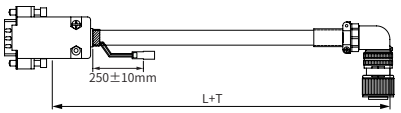
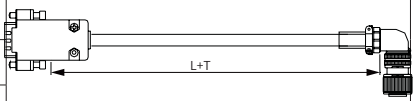
Applicable motor model	Connectors	Drawing and dimensions
MS1H1/MS1H4 flying leads type (Z-S) motors	S6-C1	
MS1H1/MS1H4 Terminal-type motors	-	

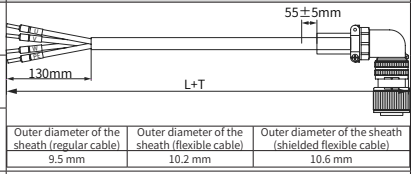
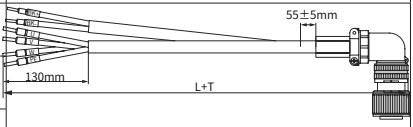
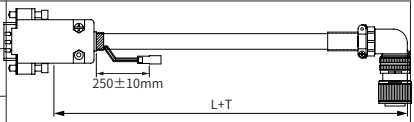
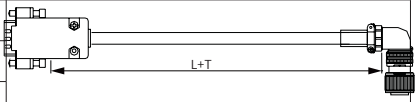
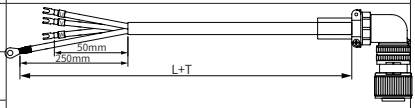
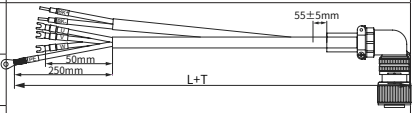
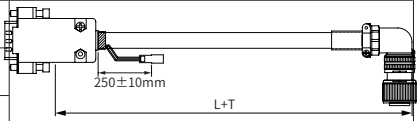
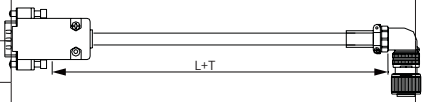
NOTE

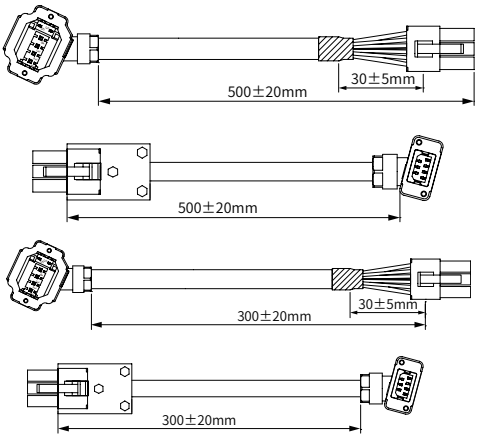
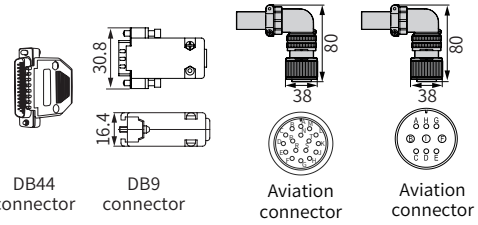
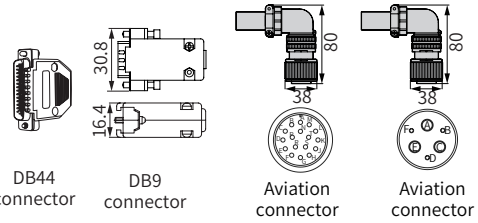
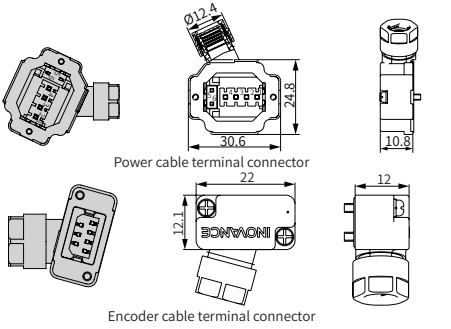
◆ Connector kits are needed only when customized cables are used.

3.3.2 Cables for IS810N-INT

Motor model	Flange size	Cable name		Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H1 MS1H4 Terminal-type motors	40 60 80	Front outlet	Power cable (brake-less)	S6-L-M107-3.0	3000	(-30,30)	
				S6-L-M107-5.0	5000	(-30,50)	
				S6-L-M107-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			Power cable (with brake)	S6-L-B107-3.0	3000	(-30,30)	
				S6-L-B107-5.0	5000	(-30,50)	
				S6-L-B107-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			23-bit absolute encoder cable	S6-L-P024-3.0	3000	(-30,30)	
				S6-L-P024-5.0	5000	(-30,50)	
				S6-L-P024-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
			Incremental encoder cable	S6-L-P014-3.0	3000	(-30,30)	
				S6-L-P014-5.0	5000	(-30,50)	
				S6-L-P014-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H1 MS1H4 Terminal-type motors	40 60 80	Rear outlet	Power cable (brake-less)	S6-L-M108-3.0	3000	(-30,30)	
				S6-L-M108-5.0	5000	(-30,50)	
				S6-L-M108-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			Power cable (with brake)	S6-L-B108-3.0	3000	(-30,30)	
				S6-L-B108-5.0	5000	(-30,50)	
				S6-L-B108-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			23-bit absolute encoder cable	S6-L-P025-3.0	3000	(-30,30)	
				S6-L-P025-5.0	5000	(-30,50)	
				S6-L-P025-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
			Incremental encoder cable	S6-L-P015-3.0	3000	(-30,30)	
				S6-L-P015-5.0	5000	(-30,50)	
				S6-L-P015-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.

Motor model	Flange size	Cable name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H1 MS1H4 Flying leads type motors	40 60 80	Power cable (brakeless)	S6-L-M100-3.0	3000	(-30,30)	
			S6-L-M100-5.0	5000	(-30,50)	
			S6-L-M100-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		Power cable (with brake)	S6-L-B100-3.0	3000	(-30,30)	
			S6-L-B100-5.0	5000	(-30,50)	
			S6-L-B100-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		23-bit absolute encoder cable	S6-L-P020-3.0	3000	(-30,30)	 DB44 connector
			S6-L-P020-5.0	5000	(-30,50)	
			S6-L-P020-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P010-3.0	3000	(-30,30)	
			S6-L-P010-5.0	5000	(-30,50)	
			S6-L-P010-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H2 MS1H3 Aviation connector-type motors	100 130	Power cable (brakeless)	S6-L-M111-3.0	3000	(-30,30)	
			S6-L-M111-5.0	5000	(-30,50)	
			S6-L-M111-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		Power cable (with brake)	S6-L-B111-3.0	3000	(-30,30)	
			S6-L-B111-5.0	5000	(-30,50)	
			S6-L-B111-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		23-bit absolute encoder cable	S6-L-P021-3.0	3000	(-30,30)	
			S6-L-P021-5.0	5000	(-30,50)	
			S6-L-P021-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P011-3.0	3000	(-30,30)	
			S6-L-P011-5.0	5000	(-30,50)	
			S6-L-P011-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.

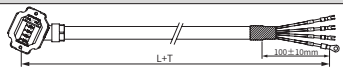
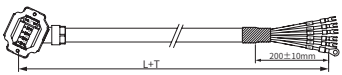
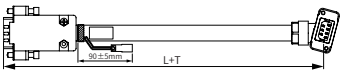
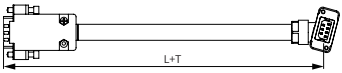
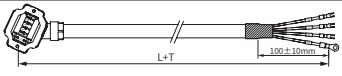
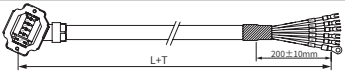
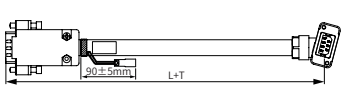
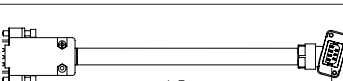
Motor model	Flange size	Cable name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H3 aviation connector-type motors (2.9 kW)	180	Power cable (brake-less)	S6-L-M112-3.0	3000	(-30,30)	
			S6-L-M112-5.0	5000	(-30,50)	
			S6-L-M112-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		Power cable (with brake)	S6-L-B112-3.0	3000	(-30,30)	
			S6-L-B112-5.0	5000	(-30,50)	
			S6-L-B112-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		23-bit absolute encoder cable	S6-L-P021-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
			S6-L-P021-5.0	5000	(-30,50)	
			S6-L-P021-10.0	10000	(-30,80)	
		Incremental encoder cable	S6-L-P011-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
			S6-L-P011-5.0	5000	(-30,50)	
			S6-L-P011-10.0	10000	(-30,80)	
MS1H3 aviation connector-type motors (4.4 kW and above)	180	Power cable (brake-less)	S6-L-M022-3.0	3000	(-30,30)	
			S6-L-M022-5.0	5000	(-30,50)	
			S6-L-M022-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 12.2 mm; Outer diameter of the sheath (flexible cable): 12.5 mm; Outer diameter of the sheath (shielded flexible cable): 13.2 mm
		Power cable (with brake)	S6-L-B022-3.0	3000	(-30,30)	
			S6-L-B022-5.0	5000	(-30,50)	
			S6-L-B022-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 12.2 mm; Outer diameter of the sheath (flexible cable): 12.5 mm; Outer diameter of the sheath (shielded flexible cable): 13.2 mm
		23-bit absolute encoder cable	S6-L-P021-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
			S6-L-P021-5.0	5000	(-30,50)	
			S6-L-P021-10.0	10000	(-30,80)	
		Incremental encoder cable	S6-L-P011-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
			S6-L-P011-5.0	5000	(-30,50)	
			S6-L-P011-10.0	10000	(-30,80)	

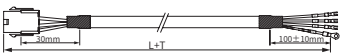
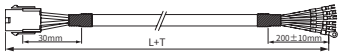
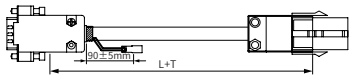
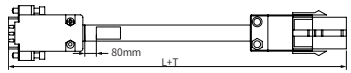
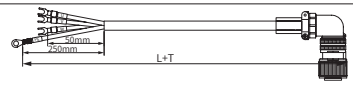
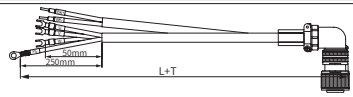
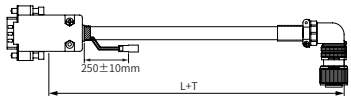
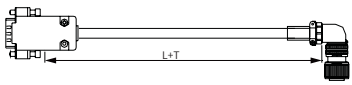
Applicable motor model	Connectors	Drawing and dimensions
MS1H1-*******-A3*** MS1H4-*******-A3*** 0.01 kW to 1 kW	S6-C23 S6-C24	
MS1H2-*******-A3*** 1.0 kW to 5.0 kW MS1H3-*******-A3*** 0.85 kW to 1.8 kW	S6-C2	
MS1H3-*******-A3*** 2.9 kW to 7.5 kW	S6-C3	
MS1H1/MS1H4 terminal-type motors	-	

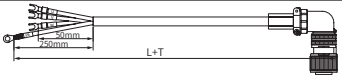
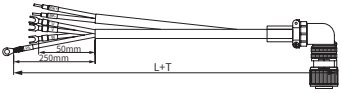
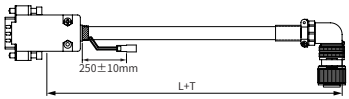
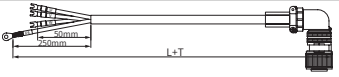
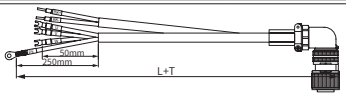
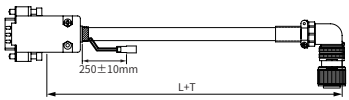
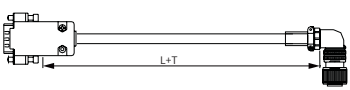
NOTE

◆ Connector kits are needed only when customized cables are used.

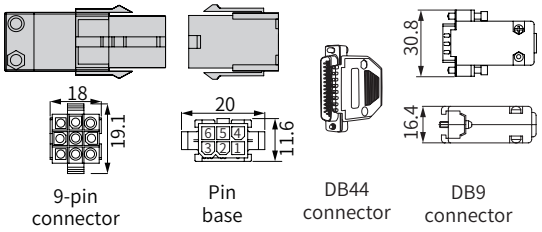
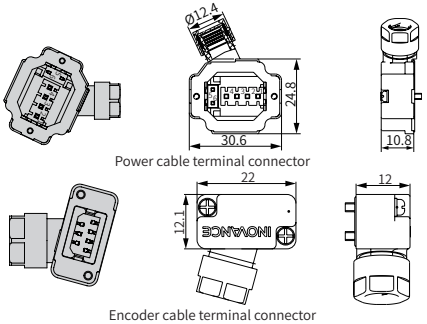
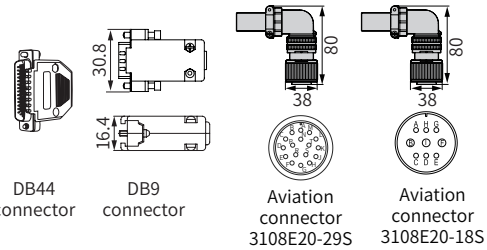
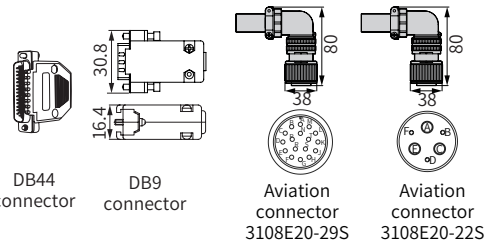
3.3.3 Cables for IS810P

Motor model	Flange size	Cables Name		Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H1 MS1H4 terminal-type motors	40 60 80	Front outlet	Power cable (brake-less)	S6-L-M007-3.0-810P	3000	(-30,30)	
				S6-L-M007-5.0-810P	5000	(-30,50)	
				S6-L-M007-10.0-810P	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			Power cable (with brake)	S6-L-B007-3.0-810P	3000	(-30,30)	
				S6-L-B007-5.0-810P	5000	(-30,50)	
				S6-L-B007-10.0-810P	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			23-bit absolute encoder cable	S6-L-P024-3.0	3000	(-30,30)	
				S6-L-P024-5.0	5000	(-30,50)	
				S6-L-P024-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
			Incremental encoder cable	S6-L-P014-3.0	3000	(-30,30)	
				S6-L-P014-5.0	5000	(-30,50)	
				S6-L-P014-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H1 MS1H4 terminal-type motors	40 60 80	Rear outlet	Power cable (brake-less)	S6-L-M008-3.0-810P	3000	(-30,30)	
				S6-L-M008-5.0-810P	5000	(-30,50)	
				S6-L-M008-10.0-810P	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			Power cable (with brake)	S6-L-B008-3.0-810P	3000	(-30,30)	
				S6-L-B008-5.0-810P	5000	(-30,50)	
				S6-L-B008-10.0-810P	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
			23-bit absolute encoder cable	S6-L-P025-3.0	3000	(-30,30)	
				S6-L-P025-5.0	5000	(-30,50)	
				S6-L-P025-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
			Incremental encoder cable	S6-L-P015-3.0	3000	(-30,30)	
				S6-L-P015-5.0	5000	(-30,50)	
				S6-L-P015-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.

Motor model	Flange size	Cables Name	Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H1 MS1H4 flying leads type motors	40 60 80	Power cable (brake-less)	S6-L-M000-3.0-810P	3000	(-30,30)	
			S6-L-M000-5.0-810P	5000	(-30,50)	
			S6-L-M000-10.0-810P	10000	(-30,80)	
						Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		Power cable (with brake)	S6-L-B000-3.0-810P	3000	(-30,30)	
			S6-L-B000-5.0-810P	5000	(-30,50)	
			S6-L-B000-10.0-810P	10000	(-30,80)	
						Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		23-bit absolute encoder cable	S6-L-P020-3.0	3000	(-30,30)	
			S6-L-P020-5.0	5000	(-30,50)	
			S6-L-P020-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P010-3.0	3000	(-30,30)	
			S6-L-P010-5.0	5000	(-30,50)	
			S6-L-P010-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H2 MS1H3 aviation connector-type motors	100 130	Power cable (brake-less)	S6-L-M011-3.0-810P	3000	(-30,30)	
			S6-L-M011-5.0-810P	5000	(-30,50)	
			S6-L-M011-10.0-810P	10000	(-30,80)	
						Outer diameter of the sheath (regular cable): 10.5 mm; Outer diameter of the sheath (flexible cable): 11.1 mm; Outer diameter of the sheath (shielded flexible cable): 11.5 mm
		Power cable (with brake)	S6-L-B011-3.0-810P	3000	(-30,30)	
			S6-L-B011-5.0-810P	5000	(-30,50)	
			S6-L-B011-10.0-810P	10000	(-30,80)	
						Outer diameter of the sheath (regular cable): 10.5 mm; Outer diameter of the sheath (flexible cable): 11.1 mm; Outer diameter of the sheath (shielded flexible cable): 11.5 mm
		23-bit absolute encoder cable	S6-L-P021-3.0	3000	(-30,30)	
			S6-L-P021-5.0	5000	(-30,50)	
			S6-L-P021-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P011-3.0	3000	(-30,30)	
			S6-L-P011-5.0	5000	(-30,50)	
			S6-L-P011-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.

Motor model	Flange size	Cables Name	Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H3 aviation connector-type motors (2.9 kW)	180	Power cable (brake-less)	S6-L-M012-3.0-810P	3000	(-30,30)	
			S6-L-M012-5.0-810P	5000	(-30,50)	
			S6-L-M012-10.0-810P	10000	(-30,80)	Outer diameter of the sheath (regular cable): 10.5 mm; Outer diameter of the sheath (flexible cable): 11.1 mm; Outer diameter of the sheath (shielded flexible cable): 11.5 mm
		Power cable (with brake)	S6-L-B012-3.0-810P	3000	(-30,30)	
			S6-L-B012-5.0-810P	5000	(-30,50)	
			S6-L-B012-10.0-810P	10000	(-30,80)	Outer diameter of the sheath (regular cable): 10.5 mm; Outer diameter of the sheath (flexible cable): 11.1 mm; Outer diameter of the sheath (shielded flexible cable): 11.5 mm
		23-bit absolute encoder cable	S6-L-P021-3.0	3000	(-30,30)	
			S6-L-P021-5.0	5000	(-30,50)	
			S6-L-P021-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P011-3.0	3000	(-30,30)	
			S6-L-P011-5.0	5000	(-30,50)	
			S6-L-P011-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H3 aviation connector-type motors (4.4 kW and above)	180	Power cable (brake-less)	S6-L-M022-3.0-810P	3000	(-30,30)	
			S6-L-M022-5.0-810P	5000	(-30,50)	
			S6-L-M022-10.0-810P	10000	(-30,80)	Outer diameter of the sheath (regular cable): 12.2 mm; Outer diameter of the sheath (flexible cable): 12.5 mm; Outer diameter of the sheath (shielded flexible cable): 13.2 mm
		Power cable (with brake)	S6-L-B022-3.0-810P	3000	(-30,30)	
			S6-L-B022-5.0-810P	5000	(-30,50)	
			S6-L-B022-10.0-810P	10000	(-30,80)	Outer diameter of the sheath (regular cable): 12.2 mm; Outer diameter of the sheath (flexible cable): 12.5 mm; Outer diameter of the sheath (shielded flexible cable): 13.2 mm
		23-bit absolute encoder cable	S6-L-P021-3.0	3000	(-30,30)	
			S6-L-P021-5.0	5000	(-30,50)	
			S6-L-P021-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P011-3.0	3000	(-30,30)	
			S6-L-P011-5.0	5000	(-30,50)	
			S6-L-P011-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.

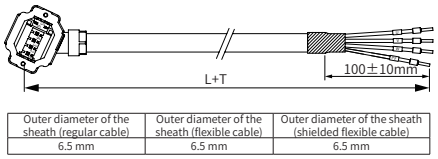
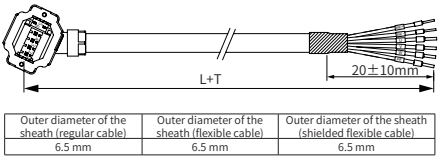
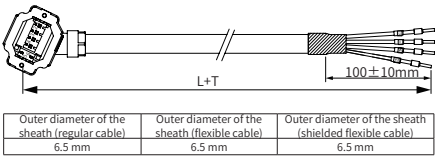
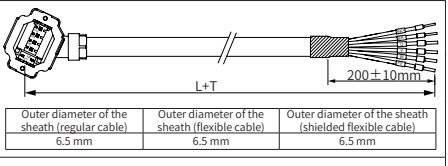
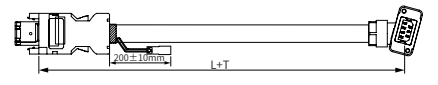
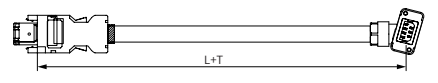
Applicable motor	Connectors	Drawing and dimensions

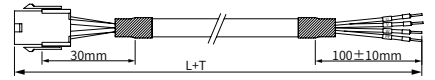
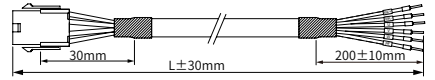
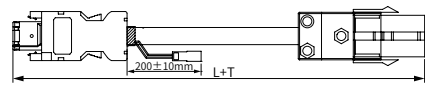
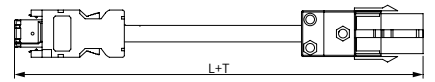
MS1H1/MS1H4 flying leads type (Z-S) motors	S6-C1	
MS1H1/MS1H4 terminal-type motors	-	
MS1H2	S6-C2	
MS1H3 motors of 1.8 kW and below		
MS1H3 motors of 2.9 kW and below	S6-C3	

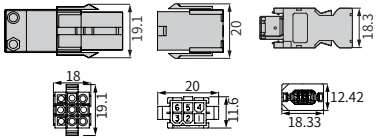
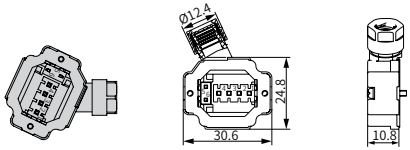
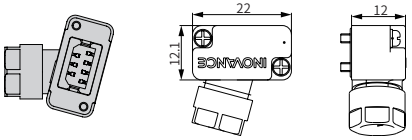
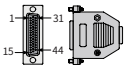
NOTE

◆ Connector kits are needed only when customized cables are used.

3.3.4 Cables for SV820N

Motor model	Flange size	Cable name		Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H1/ MS1H4 terminal-type motors	40 60 80	Front outlet	Power cable (brake-less)	S6-L-M107-3.0	3000	(-30,30)	
				S6-L-M107-5.0	5000	(-30,50)	
				S6-L-M107-10.0	10000	(-30,80)	
			Power cable (with brake)	S6-L-B107-3.0	3000	(-30,30)	
				S6-L-B107-5.0	5000	(-30,50)	
				S6-L-B107-10.0	10000	(-30,80)	
			23-bit absolute encoder cable	S6-L-P124-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
				S6-L-P124-5.0	5000	(-30,50)	
				S6-L-P124-10.0	10000	(-30,80)	
			Incremental encoder cable	S6-L-P114-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
				S6-L-P114-3.0	5000	(-30,50)	
				S6-L-P114-3.0	10000	(-30,80)	
MS1H1/ MS1H4 terminal-type motors	40 60 80	Rear outlet	Power cable (brake-less)	S6-L-M108-3.0	3000	(-30,30)	
				S6-L-M108-5.0	5000	(-30,50)	
				S6-L-M108-10.0	10000	(-30,80)	
			Power cable (with brake)	S6-L-B108-3.0	3000	(-30,30)	
				S6-L-B108-5.0	5000	(-30,50)	
				S6-L-B108-10.0	10000	(-30,80)	
			23-bit absolute encoder cable	S6-L-P125-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
				S6-L-P125-5.0	5000	(-30,50)	
				S6-L-P125-10.0	10000	(-30,80)	
			Incremental encoder cable	S6-L-P115-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
				S6-L-P115-3.0	5000	(-30,50)	
				S6-L-P115-3.0	10000	(-30,80)	

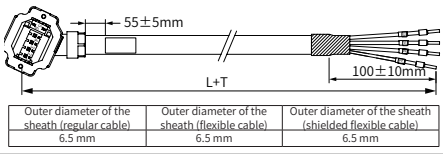
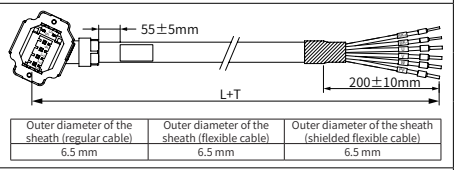
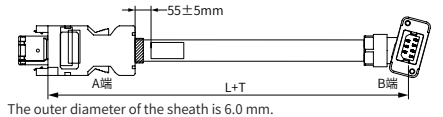
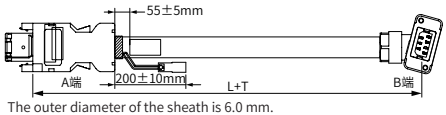
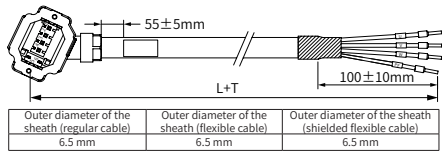
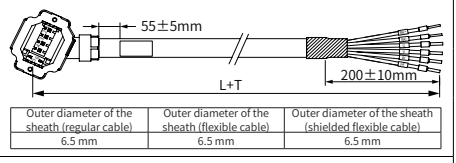
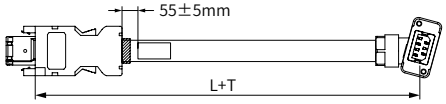
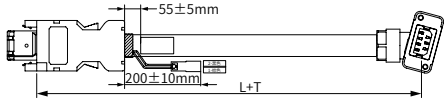
Motor model	Flange size	Cable name	Cable model	Cable length (mm)	Tolerance (T) (mm)	Drawing
MS1H1 MS1H4 flying leads type motors	40 60 80	Power cable (brake-less)	S6-L-M100-3.0	3000	(-30,30)	
			S6-L-M100-5.0	5000	(-30,50)	
			S6-L-M100-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		Power cable (with brake)	S6-L-B100-3.0	3000	(-30,30)	
			S6-L-B100-5.0	5000	(-30,50)	
			S6-L-B100-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		23-bit absolute encoder cable	S6-L-P120-3.0	3000	(-30,30)	
			S6-L-P120-5.0	5000	(-30,50)	
			S6-L-P120-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		Incremental encoder cable	S6-L-P110-3.0	3000	(-30,30)	
			S6-L-P110-5.0	5000	(-30,50)	
			S6-L-P110-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.

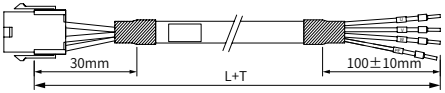
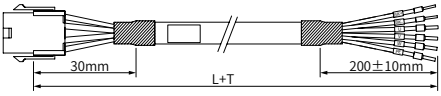
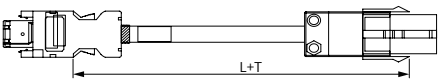
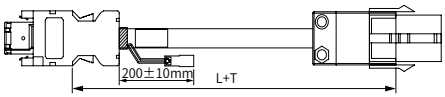
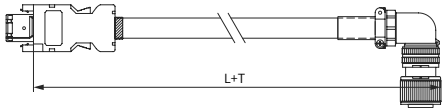
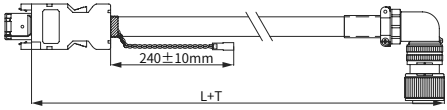
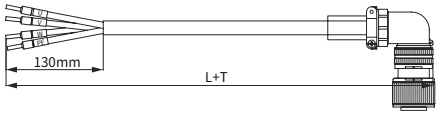
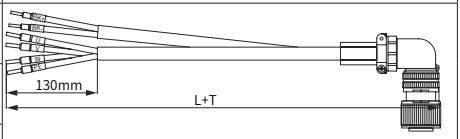
Applicable motor	Connector Kit	Drawing and dimensions
MS1H1/MS1H4 flying leads type (Z-S) motors	S6-C26	 9-pin connector Pin base 1394 male
MS1H1/MS1H4 Terminal-type motors	-	 Power cable terminal connector  Encoder cable terminal connector
All MS1 models	S6-C8	 Soldering side Side face of enclosure

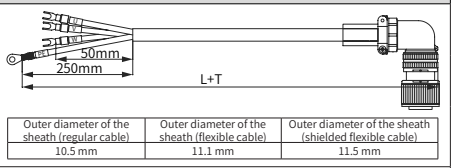
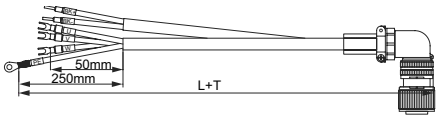
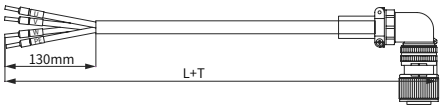
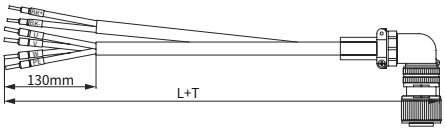
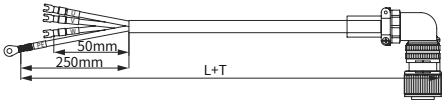
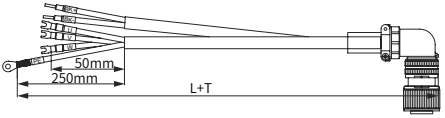
NOTE

- Connector kits are needed only when customized cables are used.
- S6-C8 needs to be purchased separately.

3.3.5 Cables for SV660P/N

Motor model	Flange size	Cable name		Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H1 MS1H4 terminal-type motors	40 60 80	Front outlet	Power cable (brake-less)	S6-L-M107-3.0	3000	(-30,30)	
				S6-L-M107-5.0	5000	(-30,50)	
				S6-L-M107-10.0	10000	(-30,80)	
			Power cable (with brake)	S6-L-B107-3.0	3000	(-30,30)	
				S6-L-B107-5.0	5000	(-30,50)	
				S6-L-B107-10.0	10000	(-30,80)	
			Incremental encoder cable	S6-L-P114-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
				S6-L-P114-5.0	5000	(-30,50)	
				S6-L-P114-10.0	10000	(-30,80)	
			23-bit absolute encoder cable	S6-L-P124-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
				S6-L-P124-5.0	5000	(-30,50)	
				S6-L-P124-10.0	10000	(-30,80)	
	40 60 80	Rear outlet	Power cable (brake-less)	S6-L-M108-3.0	3000	(-30,30)	
				S6-L-M108-5.0	5000	(-30,50)	
				S6-L-M108-10.0	10000	(-30,80)	
			Power cable (with brake)	S6-L-B108-3.0	3000	(-30,30)	
				S6-L-B108-5.0	5000	(-30,50)	
				S6-L-B108-10.0	10000	(-30,80)	
			23-bit incremental encoder cable	S6-L-P115-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
				S6-L-P115-5.0	5000	(-30,50)	
				S6-L-P115-10.0	10000	(-30,80)	
			Absolute encoder cable	S6-L-P125-3.0	3000	(-30,30)	 The outer diameter of the sheath is 6.0 mm.
				S6-L-P125-5.0	5000	(-30,50)	
				S6-L-P125-10.0	10000	(-30,80)	

Motor model	Flange size	Cable name	Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H1 MS1H4 flying leads type motors	40 60 80	Power cable (brake-less)	S6-L-M100-3.0	3000	(-30,30)	
			S6-L-M100-5.0	5000	(-30,50)	
			S6-L-M100-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		Power cable (with brake)	S6-L-B100-3.0	3000	(-30,30)	
			S6-L-B100-5.0	5000	(-30,50)	
			S6-L-B100-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 6.5 mm; Outer diameter of the sheath (flexible cable): 6.5 mm; Outer diameter of the sheath (shielded flexible cable): 6.5 mm
		Incremental encoder cable	S6-L-P110-3.0	3000	(-30,30)	
			S6-L-P110-5.0	5000	(-30,50)	
			S6-L-P110-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		23-bit absolute encoder cable	S6-L-P120-3.0	3000	(-30,30)	
			S6-L-P120-5.0	5000	(-30,50)	
			S6-L-P120-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H2 MS1H3 motor	100 130 180	Incremental encoder cable	S6-L-P111-3.0	3000	(-30,30)	
			S6-L-P111-5.0	5000	(-30,50)	
			S6-L-P111-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
		23-bit absolute encoder cable	S6-L-P121-3.0	3000	(-30,30)	
			S6-L-P121-5.0	5000	(-30,50)	
			S6-L-P121-10.0	10000	(-30,80)	The outer diameter of the sheath is 6.0 mm.
MS1H2 motors of 3 kW and below/ MS1H3 motors of 1.8 kW and below	100 130	Power cable (brake-less)	S6-L-M111-3.0	3000	(-30,30)	
			S6-L-M111-5.0	5000	(-30,50)	
			S6-L-M111-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm
		Power cable (with brake)	S6-L-B111-3.0	3000	(-30,30)	
			S6-L-B111-5.0	5000	(-30,50)	
			S6-L-B111-10.0	10000	(-30,80)	Outer diameter of the sheath (regular cable): 9.5 mm; Outer diameter of the sheath (flexible cable): 10.2 mm; Outer diameter of the sheath (shielded flexible cable): 10.6 mm

Motor model	Flange size	Cable name	Cable model	Cable length (mm)	Tolerance (mm)	Drawing
MS1H2 motor rated 4 kW/5 kW	130	Power cable for brake-less motor	S6-L-M011-3.0	3000	(-30,30)	
			S6-L-M011-5.0	5000	(-30,50)	
			S6-L-M011-10.0	10000	(-30,80)	
		Power cable for brake-less motor	S6-L-B011-3.0	3000	(-30,30)	
			S6-L-B011-5.0	5000	(-30,50)	
			S6-L-B011-10.0	10000	(-30,80)	
MS1H3 motors (2.9 kW)	180	Power cable for brake-less motor	S6-L-M112-3.0	3000	(-30,30)	
			S6-L-M112-5.0	5000	(-30,50)	
			S6-L-M112-10.0	10000	(-30,80)	
		Power cable for brake-less motor	S6-L-B112-3.0	3000	(-30,30)	
			S6-L-B112-5.0	5000	(-30,50)	
			S6-L-B112-10.0	10000	(-30,80)	
MS1H3 (4.4 kW and above)	180	Power cable for brake-less motor	S6-L-M022-3.0	3000	(-30,30)	
			S6-L-M022-5.0	5000	(-30,50)	
			S6-L-M022-10.0	10000	(-30,80)	
		Power cable for brake-less motor	S6-L-B022-3.0	3000	(-30,30)	
			S6-L-B022-5.0	5000	(-30,50)	
			S6-L-B022-10.0	10000	(-30,80)	

Outer diameter of the sheath (regular cable)	Outer diameter of the sheath (flexible cable)	Outer diameter of the sheath (shielded flexible cable)
10.5 mm	11.1 mm	11.5 mm

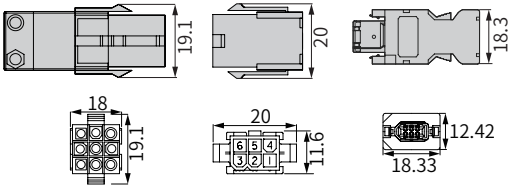
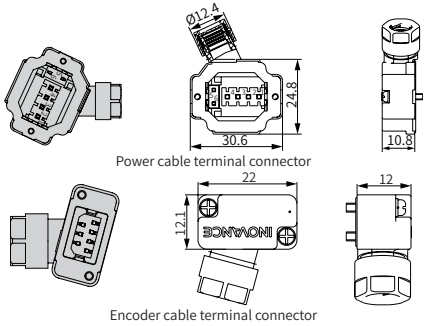
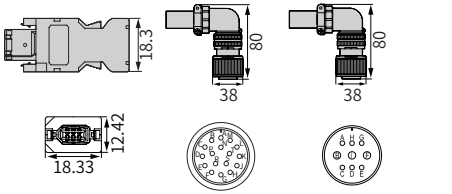
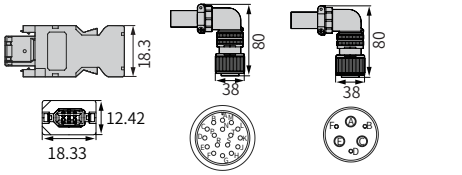
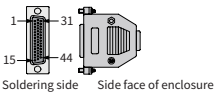
Outer diameter of the sheath (regular cable)	Outer diameter of the sheath (flexible cable)	Outer diameter of the sheath (shielded flexible cable)
10.5 mm	11.1 mm	11.5 mm

Outer diameter of the sheath (regular cable)	Outer diameter of the sheath (flexible cable)	Outer diameter of the sheath (shielded flexible cable)
9.5 mm	10.2 mm	10.6 mm

Outer diameter of the sheath (regular cable)	Outer diameter of the sheath (flexible cable)	Outer diameter of the sheath (shielded flexible cable)
9.5 mm	10.2 mm	10.6 mm

Outer diameter of the sheath (regular cable)	Outer diameter of the sheath (flexible cable)	Outer diameter of the sheath (shielded flexible cable)
12.2 mm	12.5 mm	13.2 mm

Outer diameter of the sheath (regular cable)	Outer diameter of the sheath (flexible cable)	Outer diameter of the sheath (shielded flexible cable)
12.2 mm	12.5 mm	13.2 mm

Applicable motor	Connector Kit	Drawing and dimensions
MS1H1/MS1H4 flying leads type (Z-S) motors	S6-C26	
MS1H1/MS1H4 Terminal-type motors	-	
MS1H2/MS1H3 motors of 1.8kW and below	S6-C29	
MS1H3 motors of 2.9 kW and above	S6-C39	
All MS1 models	S6-C8	

NOTE

- Connector kits are needed only when customized cables are used.
- S6-C8 needs to be purchased separately.

3.4 Cable Connection

3.4.1 Connecting Power Cables

■ Connecting Power Cables of IS620 Series Servo Drives

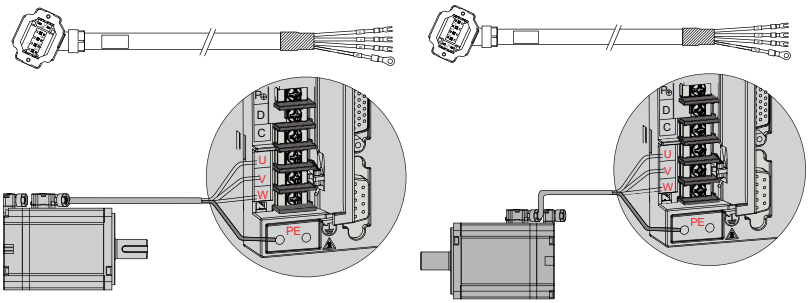


Figure 3-3 Connecting power cables of IS620 series servo drives

Table 3-1 Power cable connector (servo motor side)

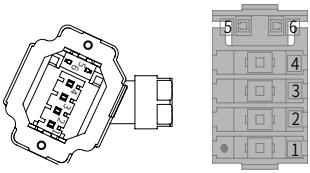
Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	 SDC-06T (manufacture: JONHON)	1	PE	Yellow/ Green
		2	W	Red
		3	V	Black
		4	U	White
		5	Brake (polarity insensitive)	Brown
		6		Blue

Table 3-2 Power cable connector (servo motor side)

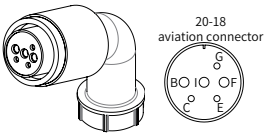
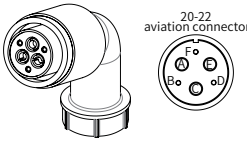
Applicable flange size [note]	Drawing of the connector	Pin layout		
		New Structure		Color
		Pin No.	Signal name	
100 130	 20-18 aviation connector MIL-DTL-5015 series 3108E20-18S aviation connector	B	U	Blue
		I	V	Black
		F	W	Red
		G	PE	Yellow/Green
		C	Brake (polarity insensitive)	-
		E		-

Table 3-3 Power cable connector (servo motor side)

Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
180	 MIL-DTL-5015 series 3108E20-22S aviation connector	A	U	Blue
		C	V	Black
		E	W	Red
		F	PE	Yellow/Green
		B	Brake (polarity insensitive)	-
		D		

NOTE

- The flange size refers to the width of the mounting flange.
- Power cable colors are subject to the actual product. All cable colors mentioned in this guide refer to Inovance cable colors.

■ Connecting Power Cables of IS810N-INT Series Servo Drives

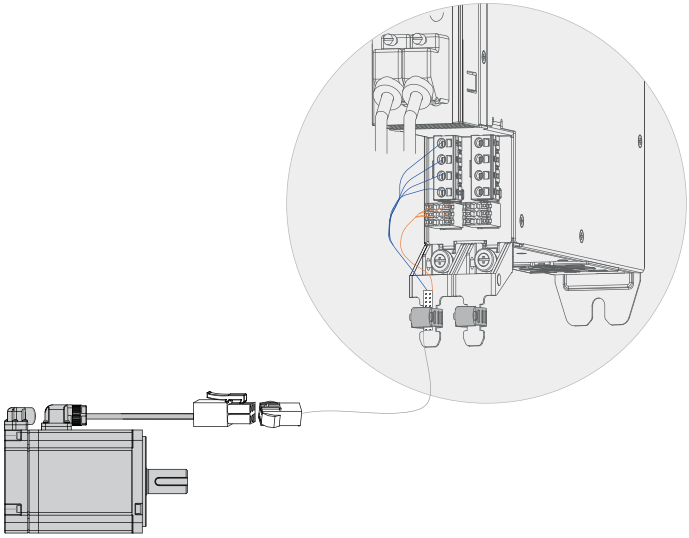


Figure 3-4 Power cable connector (motor side)

Table 3-4 Description of the power cable connector for flying leads type motors (motor side)

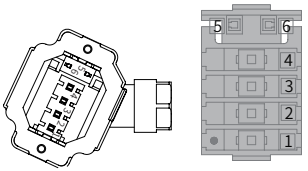
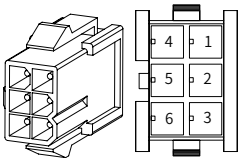
Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	 SDC-06T (manufacture: JONHON)	1	PE	Yellow/ Green
		2	W	Red
		3	V	Black
		4	U	White
		5	Brake (polarity insensitive)	Brown
		6		Blue
Flying lead type motor 40 (Z-S series) 60 (Z-S series) 80 (Z-S series)	 Black 6-pin connector Recommendation: Plastic housing: MOLEX-50361736 Terminal: MOLEX-39000061	1	U	White
		2	V	Black
		4	W	Red
		5	PE	Yellow/ Green
		3	Brake (polarity insensitive)	-
		6		

Table 3-5 Description of the power cable connector (motor side)

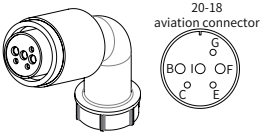
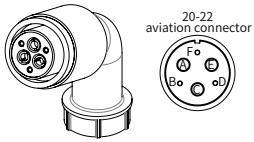
Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
100 130	 MIL-DTL-5015 series 3108E20-18S aviation connector	B	U	Blue
		I	V	Black
		F	W	Red
		G	PE	Yellow/ Green
		C	Brake (polarity insensitive)	-
		E		

Table 3-6 Description of the power cable connector (motor side)

Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
180	 MIL-DTL-5015 series 3108E20-22S aviation connector	A	U	Blue
		C	V	Black
		E	W	Red
		F	PE	Yellow/ Green
		B	Brake (polarity insensitive)	-
		D		

NOTE

- The flange size refers to the width of the mounting flange.
- Power cable colors are subject to the actual product. All cable colors mentioned in this guide refer to Inovance cable colors.

Connecting Power Cables of IS810P Series Servo Drives

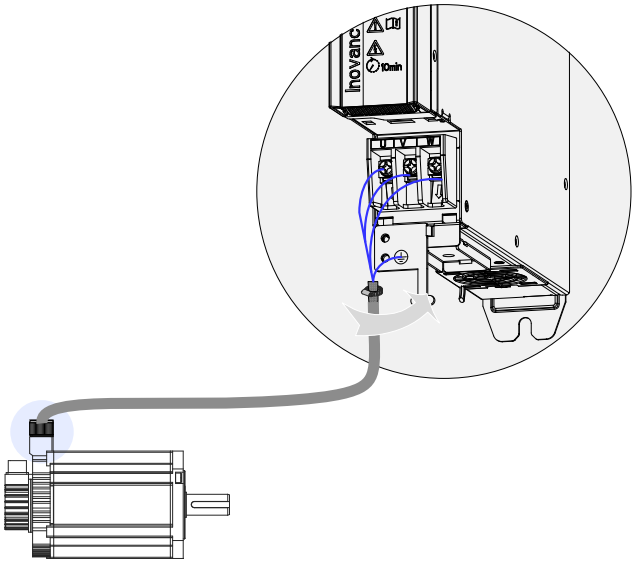
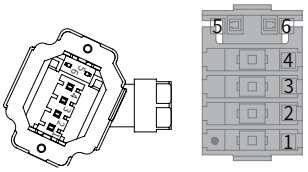
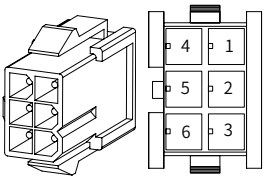


Figure 3-5 Connection between the servo drive and servo motor

Table 3-7 Power cable connector for flying leads type motors (motor side)

<table>
<tr><th rowspan="2">Applicable flange size [note]</th><th rowspan="2">Drawing of the connector</th><th colspan="3">Pin layout</th></tr>
<tr><th>Pin No.</th><th>Signal name</th><th>Color</th></tr>
<tr><td rowspan="7">Terminal-type motor:
40 (Z series)
60 (Z series)
80 (Z series)</td><td rowspan="7"> 

SDC-06T (manufacture: JONHON)</td><td>1</td><td>PE</td><td>Yellow/ Green</td></tr>
<tr><td>2</td><td>W</td><td>Red</td></tr>
<tr><td>3</td><td>V</td><td>Black</td></tr>
<tr><td>4</td><td>U</td><td>White</td></tr>
<tr><td>5</td><td rowspan="2">Brake (polarity insensitive)</td><td>Brown</td></tr>
<tr><td>6</td><td>Blue</td></tr>
<tr><td rowspan="6">Flying leads type motor:
40 (Z-S series)
60 (Z-S series)
80 (Z-S series)</td><td rowspan="6"> 

Black 6-pin connector
Recommendation:
Plastic housing: MOLEX-50361736
Terminal: MOLEX-39000061</td><td>1</td><td>U</td><td>White</td></tr>
<tr><td>2</td><td>V</td><td>Black</td></tr>
<tr><td>4</td><td>W</td><td>Red</td></tr>
<tr><td>5</td><td>PE</td><td>Yellow/ Green</td></tr>
<tr><td>3</td><td rowspan="2">Brake (polarity insensitive)</td><td rowspan="2">-</td></tr>
<tr><td>6</td></tr>
</table>

Table 3-8 Power cable connector (motor side)

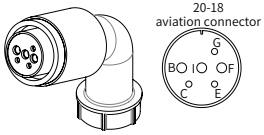
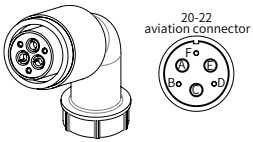
Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
100 130	 MIL-DTL-5015 series 3108E20-18S aviation connector	B	U	Blue
		I	V	Black
		F	W	Red
		G	PE	Yellow/ Green
		C	Brake (polarity insensitive)	-
		E		-

Table 3-9 Description of the power cable connector (motor side)

Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
180	 MIL-DTL-5015 series 3108E20-22S aviation connector	A	U	Blue
		C	V	Black
		E	W	Red
		F	PE	Yellow/ Green
		B	Brake (polarity insensitive)	-
		D		

NOTE

- The flange size refers to the width of the mounting flange.
- Power cable colors are subject to the actual product. All cable colors mentioned in this guide refer to Inovance cable colors.

Connecting Power Cables of SV820N Series Servo Drives

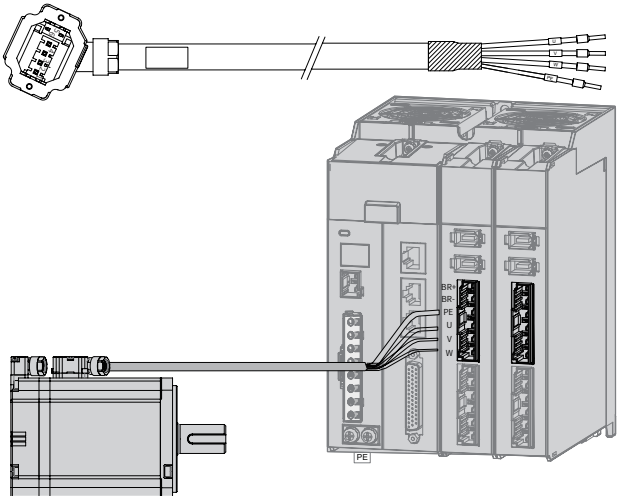
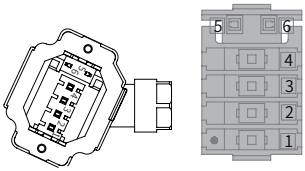
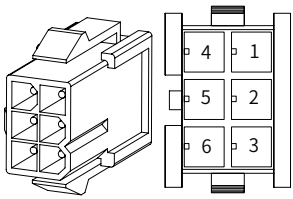


Figure 3-6 Connecting power cables of SV820N series servo drives

Table 3-10 Power cable connector (motor side)

Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	 SDC-06T (manufacture: JONHON)	1	PE	Yellow/ Green
		2	W	Red
		3	V	Black
		4	U	White
		5	Brake (polarity insensitive)	Brown
		6		Blue
Flying leads type motor: 40 (Z-S series) 60 (Z-S series) 80 (Z-S series)	 Black 6-pin connector Recommendation: Plastic housing: MOLEX-50361736 Terminal: MOLEX-39000061	1	U	White
		2	V	Black
		4	W	Red
		5	PE	Yellow/ Green
		3	Brake (polarity insensitive)	Brown
		6		Blue

Connecting Power Cables of SV660 Series Servo Drives

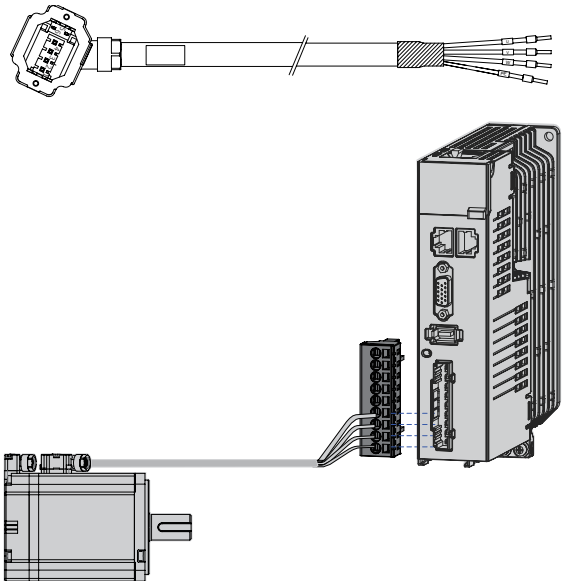
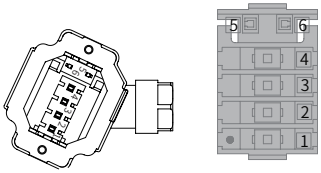


Figure 3-7 Connection between the servo drive and terminal-type motor

Table 3-11 Power cable connector (motor side)

Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	 SDC-06T (manufacture: JONHON)	1	PE	Yellow/ Green
		2	W	Red
		3	V	Black
		4	U	White
		5	Brake (polarity insensitive)	Brown
		6		Blue

NOTE

- The flange size refers to the width of the mounting flange.
- Power cable colors are subject to the actual product. All cable colors mentioned in this guide refer to Inovance cable colors.

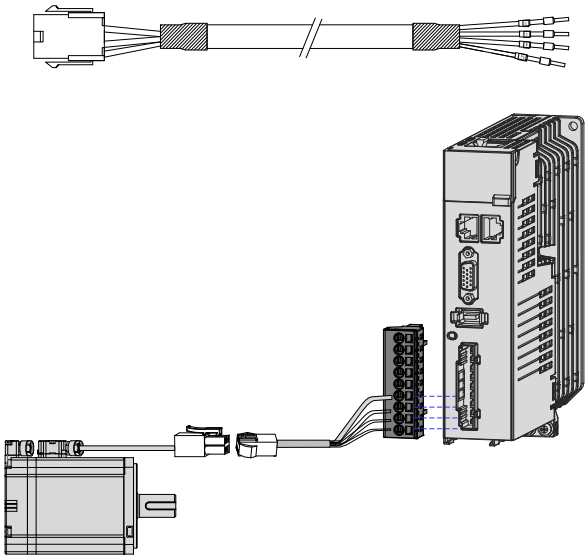


Figure 3-8 Connection between the servo drive and flying leads type motor

Table 3-12 Power cable connector (motor side)

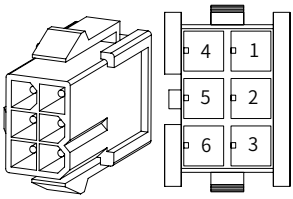
Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
Flying leads type motor: 40 (Z-S series) 60 (Z-S series) 80 (Z-S series)	 Black 6-pin connector Recommendation: Plastic housing: MOLEX-50361736 Terminal: MOLEX-39000061	1	U	White
		2	V	Black
		4	W	Red
		5	PE	Yellow/ Green
		3	Brake (polarity insensitive)	-
		6		

Table 3-13 Power cable connector (motor side)

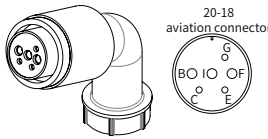
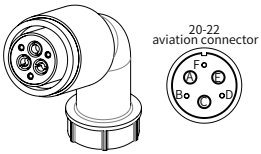
Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
100 130	 MIL-DTL-5015 series 3108E20-18S aviation connector	B	U	Blue
		I	V	Black
		F	W	Red
		G	PE	Yellow/ Green
		C	Brake (polarity insensitive)	-
		E		-

Table 3-14 Power cable connector (motor side)

Applicable flange size [note]	Drawing of the connector	Pin layout		
		Pin No.	Signal name	Color
180	 MIL-DTL-5015 series 3108E20-22S aviation connector	A	U	Blue
		C	V	Black
		E	W	Red
		F	PE	Yellow/ Green
		B	Brake (polarity insensitive)	-
		D		

NOTE

- The flange size refers to the width of the mounting flange.
- Power cable colors are subject to the actual product. All cable colors mentioned in this guide refer to Inovance cable colors.

3.4.2 Connecting Absolute Encoder Cables

■ Connecting Encoder Cables of IS620 Series Servo Drives

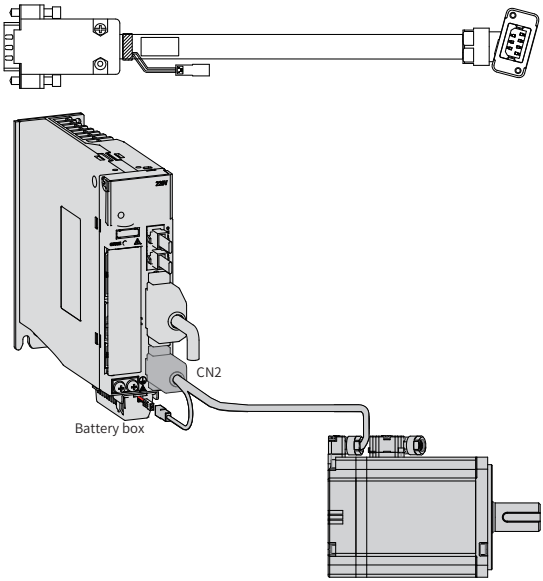


Figure 3-9 Connecting encoder cables of IS620 series servo drives

Table 3-15 Encoder cable connector

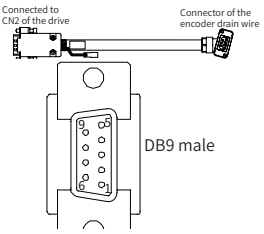
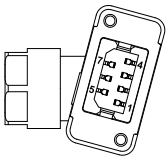
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
	Motor side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			3	DC+	Brown	Twisted pair
			4	DC-	Black	
			5	+5V	Red	Twisted pair
			6	0V	Orange	
			7	PE	-	-

Table 3-16 Absolute encoder cable connector (9-pin connector)

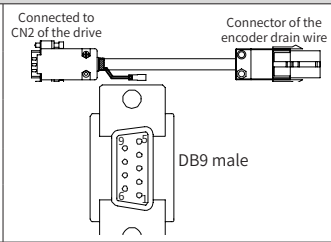
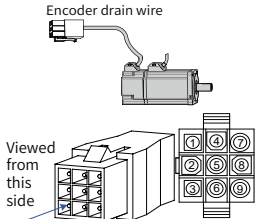
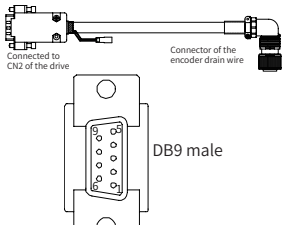
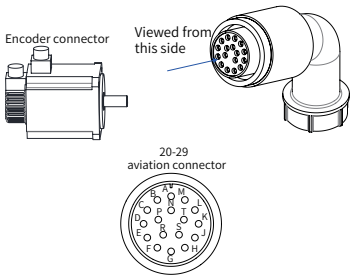
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Flying leads type motor: 40 (Z-S series) 60 (Z-S series) 80 (Z-S series)	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
	Motor side	 Recommendation: Plastic enclosure:AMP 172161-1; Terminal: AMP 770835-1	1	Battery (+)	Brown	Twisted pair
			4	Battery (-)	Black	
			3	PS+	Blue	Twisted pair
			6	PS-	Purple	
			9	+5V	Red	-
			8	GND	Orange	
			7	Shield	-	

Table 3-17 Encoder cable connector

Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
100	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
130 180	Motor side		A	PS+	Blue	Twisted pair
			B	PS-	Purple	
			E	DC+	Brown	Twisted pair
			F	DC-	Black	
			G	+5V	Red	Twisted pair
			H	GND	Orange	
			J	Shield	-	-

■ Connecting encoder cables of IS810N-INT series servo drives

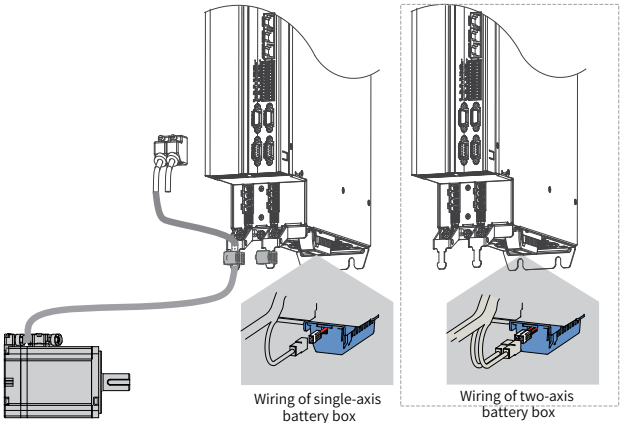


Figure 3-10 Connecting encoder cables of IS810 series servo drives

Table 3-18 Encoder cable connector

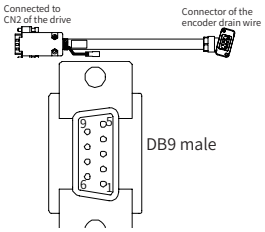
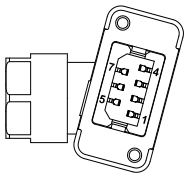
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
	Motor side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			3	DC+	Brown	Twisted pair
			4	DC-	Black	
			5	+5V	Red	Twisted pair
			6	0V	Orange	
			7	PE	-	-

Table 3-19 Encoder cable connector (9-pin connector)

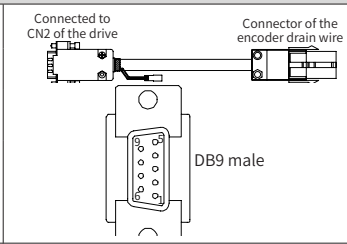
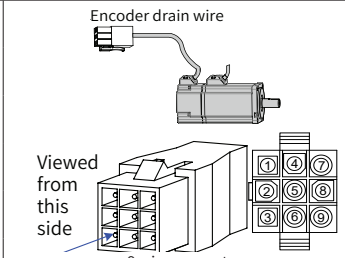
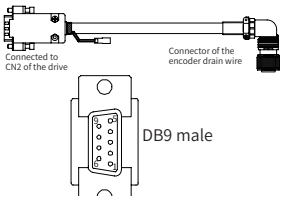
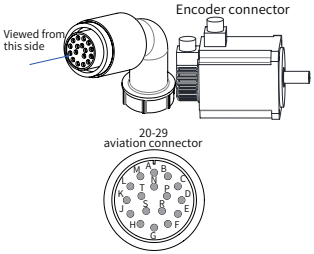
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Flying leads type motor: 40 (Z-S series) 60 (Z-S series) 80 (Z-S series)	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
	Motor side	 Recommendation: Plastic enclosure: AMP 172161-1; Terminal: AMP 770835-1	1	Battery (+)	Brown	-
			4	Battery (-)	Black	
			3	PS+	Blue	Twisted pair
			6	PS-	Purple	
			9	+5V	Red	-
			8	GND	Orange	
			7	Shield	-	

Table 3-20 Encoder cable connector

Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
100 130 180	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
	Motor side		A	PS+	Yellow	Twisted pair
			B	PS-	Blue	
			E	DC+	Brown	Twisted pair
			F	DC-	Black	
			G	+5V	Red	-
			H	GND	Orange	
			J	Shield	-	

Connecting encoder cables of IS810P series servo drives

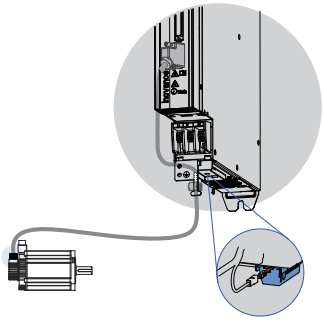


Figure 3-11 Wiring example of absolute encoder signals and the battery box

Table 3-21 Encoder cable connector

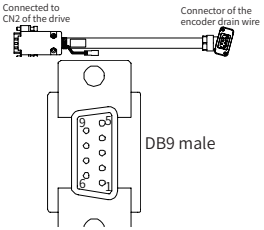
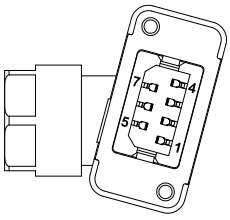
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
	Motor side	 SDC-07T	1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			3	DC+	Brown	Twisted pair
			4	DC-	Black	
			5	+5V	Red	Twisted pair
			6	0V	Orange	
			7	PE	-	-

Table 3-22 Absolute encoder cable connector (9-pin connector)

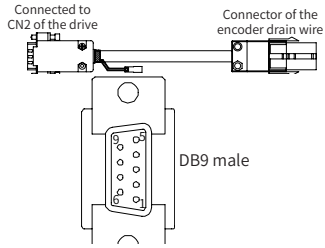
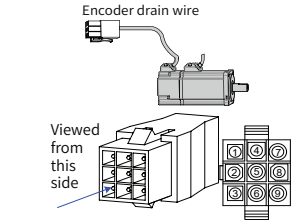
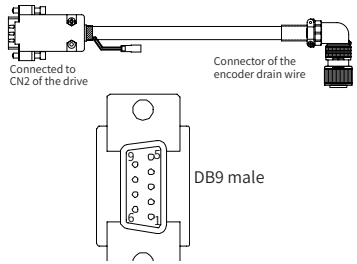
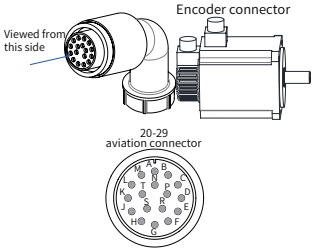
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Flying leads type motor: 40 (Z-S series) 60 (Z-S series) 80 (Z-S series)	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
	Motor side	 Recommendation: Plastic enclosure: AMP 172161-1; Terminal: AMP 770835-1	1	Battery (+)	Brown	-
			4	Battery (-)	Black	
			3	PS+	Blue	Twisted pair
			6	PS-	Purple	
			9	+5V	Red	-
			8	GND	Orange	
			7	Shield		

Table 3-23 Absolute encoder cable connector (MIL-DTL-5015 series 3108E20-29S aviation connector)

Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
100 130 180	Drive side		1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			7	+5V	Red	Twisted pair
			8	0V	Orange	
			Enclosure	PE	-	-
	Motor side		A	PS+	Blue	Twisted pair
			B	PS-	Purple	
			E	DC+	Brown	Twisted pair
			F	DC-	Black	
			G	+5V	Red	-
			H	GND	Orange	
			J	Shield	-	

■ Connecting encoder cables of SV820N Series Servo Drives

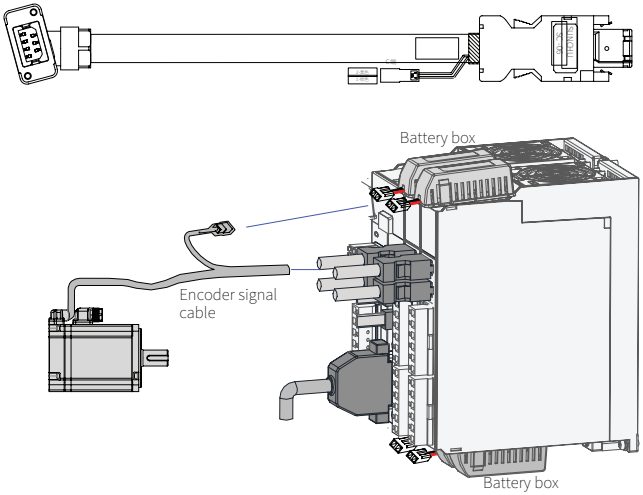


Figure 3-12 Connecting encoder cables of SV820N series servo drives

Table 3-24 Encoder cable connector (terminal-type motor)

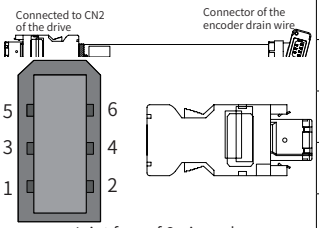
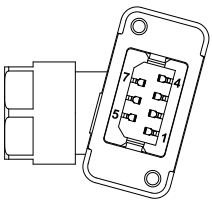
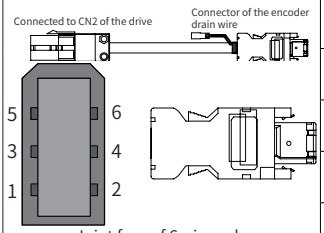
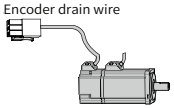
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	Drive side	 Joint face of 6-pin male	1	+5V	Red	Twisted pair
			2	0V	Orange	
			5	PS+	Blue	Twisted pair
			6	PS-	Purple	
			Enclosure	PE	-	-
	Motor side	 SDC-07T (manufacture: JONHON)	1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			3	DC+	Brown	Twisted pair
			4	DC-	Black	
			5	+5V	Red	Twisted pair
			6	0V	Orange	
			7	PE	-	-

Table 3-25 Encoder cable connector (flying leads type motor)

Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Flying leads type motor: 40 (Z-S series) 60 (Z-S series) 80 (Z-S series)	Drive side	 Joint face of 6-pin male	1	+5V	Red	Twisted pair
			2	0V	Orange	
			5	PS+	Blue	Twisted pair
			6	PS-	Purple	
			Enclosure	PE	-	-
	Motor side	 9-pin connector Recommendation: Plastic housing: AMP 172161-1 Terminal: AMP 770835-1	1	Battery (+)	Brown	Twisted pair
			4	Battery (-)	Black	
			3	PS+	Blue	Twisted pair
			6	PS-	Purple	
			9	+5V	Red	Twisted pair
			8	GND	Orange	
			7	Shield	-	-

■ Connecting encoder cables of SV660 Series Servo Drives

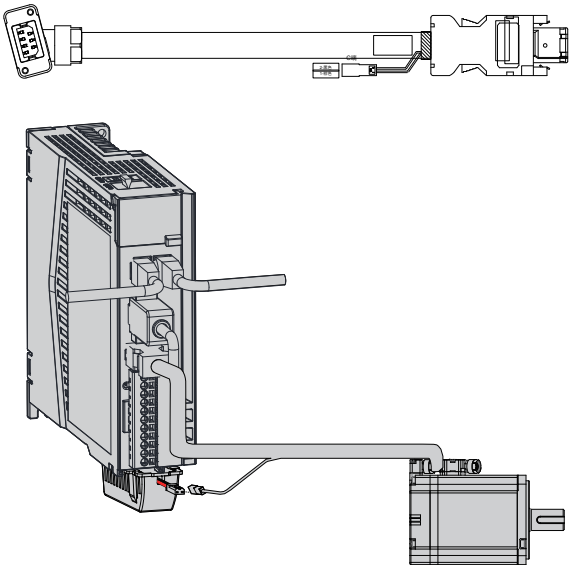


Figure 3-13 Connection between terminal-type motor and SV660N series servo drive

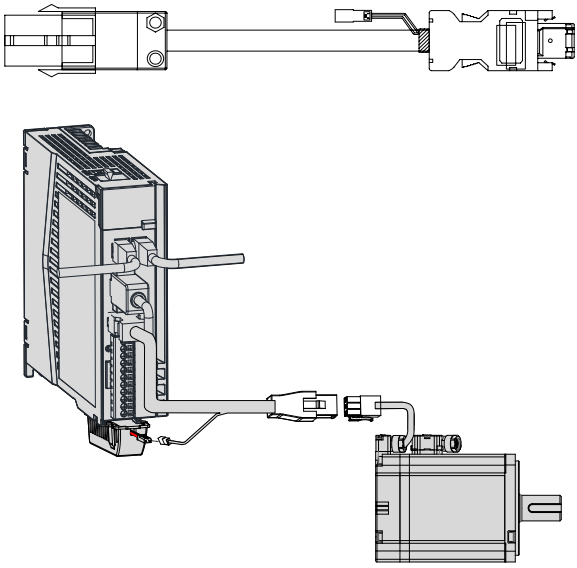


Figure 3-14 Connection between flying leads type motor and SV660N series servo drive

Table 3-26 Terminal-type motor encoder cable connector

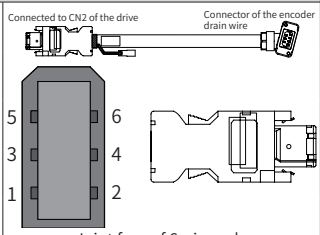
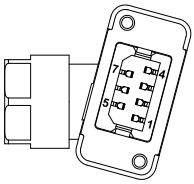
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Terminal-type motor: 40 (Z series) 60 (Z series) 80 (Z series)	Drive side	 Joint face of 6-pin male	1	+5V	Red	Twisted pair
			2	0V	Orange	
			5	PS+	Blue	Twisted pair
			6	PS-	Purple	
			Enclosure	PE	-	-
	Motor side	 SDC-07T (manufacture: JONHON)	1	PS+	Blue	Twisted pair
			2	PS-	Purple	
			3	DC+	Brown	Twisted pair
			4	DC-	Black	
			5	+5V	Red	Twisted pair
			6	0V	Orange	
			7	PE	-	-

Table 3-27 Flying leads type motor encoder cable connector (9-pin connector)

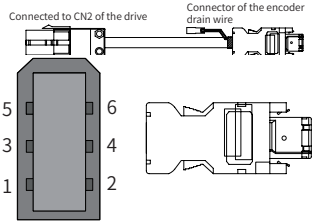
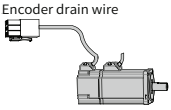
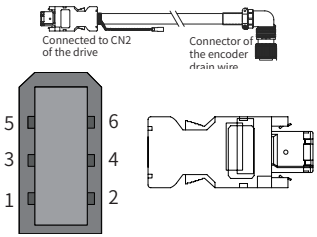
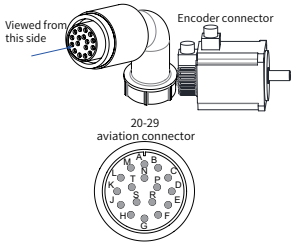
Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
Flying leads type motor: 40 (Z-S series) 60 (Z-S series) 80 (Z-S series)	Drive side	 Joint face of 6-pin male	1	+5V	Red	Twisted pair
			2	0V	Orange	
			5	PS+	Blue	Twisted pair
			6	PS-	Purple	
			Enclosure	PE	-	-
	Motor side	 9-pin connector Recommendation: Plastic housing: AMP 172161-1 Terminal: AMP 770835-1	1	Battery (+)	Brown	Twisted pair
			4	Battery (-)	Black	
			3	PS+	Blue	Twisted pair
			6	PS-	Purple	
			9	+5V	Red	Twisted pair
			8	GND	Orange	
			7	Shield	-	-

Table 3-28 Absolute encoder cable connector (MIL-DTL-5015 series 3108E20-29S aviation connector)

Applicable flange size	Drawing of the connector		Pin layout			
			Pin No.	Signal name	Color	Type
100 130 180	Drive side	 Joint face of 6-pin male	A	PS+	Yellow	Twisted pair
			B	PS-	Yellow-black	
			E	Battery (+)	Blue	-
			F	Battery (-)	Blue-black	
			G	+5V	Red	-
			H	GND	Black	
			J	Shield	-	
	Motor side		A	PS+	Yellow	Twisted pair
			B	PS-	Yellow-black	
			E	Battery (+)	Blue	-
			F	Battery (-)	Blue-black	
			G	+5V	Red	-
			H	GND	Black	
			J	Shield	-	

3.4.3 Insertion Requirements for Plugs and Connectors

■ Power connector

CAUTION	
	Screw-down is allowed only when the rubber gasket of the plug is in place with both long edges kept flat.

Align pins 5 and 6 with corresponding holes and insert them into the holes. Do not insert pins 5 and 6 by force. After insertion, screw down with a tightening torque of 0.19 N·m to 0.21 N·m.

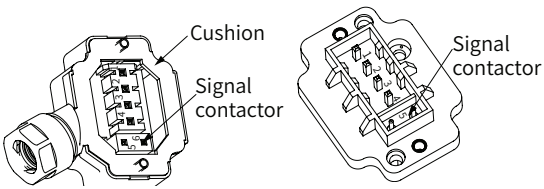


Figure 3-15 Power connector

■ Encoder connector

CAUTION
Screw-down is allowed only when the rubber gasket of the plug is in place with both long edges locked into the enclosure slot flatly.

Plugs and sockets are designed with fool-proof chamfers (as shown below). Align the fool-proof chamfer before insertion. After insertion, screw down the plug screws to the panel with a tightening torque of 0.19 N · m to 0.21 N · m.

Screw-down is allowed only when the rubber gasket of the plug is in place with both long edges locked into the enclosure slot flatly.

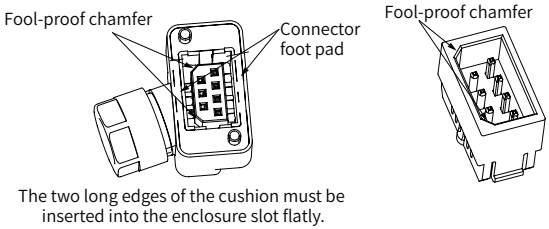


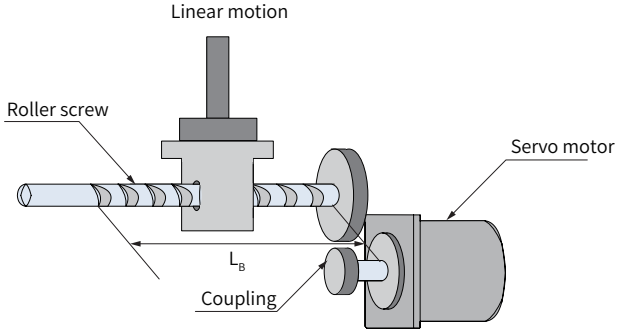
Figure 3-16 Encoder connector

NOTE

- The assembly direction of the plug insulator is subject to the actual direction.
- Do not energize an electrical connector connected loosely. Plug-in/out is not allowed when the power is on.
- The mating life of the electrical connector is 50 cycles. Ensure the joint face of the socket and plug is clean and free from greasy dirt in the whole service life. Handle with enough care during use to prevent injuries.
- Check whether the socket and the plug are free from condensation and dirt each time before mating.
- When the connector is idled with its socket and plug separated, take proper measures to prevent intrusion of dust and liquid.

Appendix A Capacity Selection Examples

A.1 Capacity Selection Example for Position Control



Load speed (V_L): 15 m/min

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

Length of the ball screw (L_B): 0.8 m

Diameter of the ball screw (d_B): 0.016 m

Pitch of the ball screw (P_B): 0.005 m

Mass of the coupling (m_c): 0.3 kg

Outer diameter of the coupling (d_c) = 0.03 m

Times of feeding (n): 40/min

Length of feeding (L): 0.25 m

Feeding time (t_m): < 1.2s

Electrical stop precision (δ) = ±0.01 mm

Friction coefficient (μ): 0.2

Mechanical efficiency (η): 0.9 (90%)

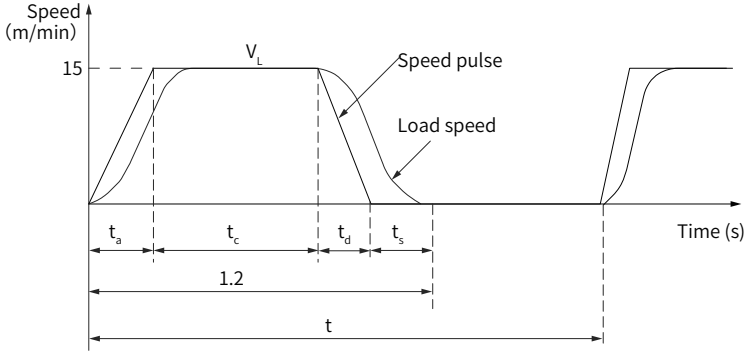
■ Speed diagram

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

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

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

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



■ Speed

■ Rotational speed of the load shaft

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

■ Rotational speed of the motor shaft

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

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

■ Load torque

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

■ Load moment of inertia

■ Rectilinear motion part

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

■ Ball screw

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

■ Coupling

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

■ Load moving power

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

■ Load acceleration power

$$P_a = \left(\frac{2\pi}{60} \times n_m\right)^2 \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_{LI} + J_B + J_C}{t_a}$$

$$= \left(\frac{2\pi}{60} \times 3000\right)^2 \times \frac{1.25 \times 10^{-4}}{0.1} = 123.4\ (W)$$

■ Temporary settings of the servo motor

■ Selection condition

$T_L \leqslant$ Rated torque of the motor

P a+P o= (1 to 2) x Rated output of the motor

$n_M \leqslant$ Rated speed of the motor

$J_L \leqslant$ Allowable load moment of inertia of the servo unit

Perform the following temporary selections according to preceding conditions:

Servo motor: MS1H1-20B30CB-A331Z

Servo drive: SV660PS2R8I

■ Specifications of the servo motor and servo drive

Rated output: 200 (W)

Rated speed: 3000 (rpm)

Rated torque: 0.637 (N·m)

Maximum transient torque: 1.91 (N·m)

Rotor moment of inertia: 0.158×10^{-4} ($kg \cdot m^2$)

Allowable load moment of inertia: 3.69×10^{-4} ($kg \cdot m^2$)

Number of encoder pulses: 8388608 PPR

■ Confirmation of the servo motor selected temporarily

■ Confirm the starting torque required

$$T_p = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} + T_L = \frac{2\pi \times 3000 \times (0.158 + 1.25) \times 10^{-4}}{60 \times 0.1} + 0.139$$

$= 0.581\ (N \cdot m) <$ Maximum instantaneous torque…Satisfactory

■ Confirm the brake torque required

$$T_s = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} - T_L = \frac{2\pi \times 3000 \times (0.158 + 1.25) \times 10^{-4}}{60 \times 0.1} - 0.139$$

$= 0.303(N \cdot m) <$ Maximum instantaneous torque…Satisfactory

■ Confirm the effective torque value

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

$$= \sqrt{\frac{(0.581)^2 \times 0.1 + (0.139)^2 \times 0.9 + (0.303)^2 \times 0.1}{1.5}}$$

$= 0.2\ (N \cdot m) <$ Maximum instantaneous torque…Satisfactory

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

■ Electronic gear ratio (B/A)

As the electrical stop precision (δ) is ±0.01 mm, set the position detection unit (△ L) to 0.01 mm/pulse.

$$\frac{P_B}{\Delta L} \times \frac{B}{A} = \frac{5}{0.01} \times \frac{B}{A} = 8388608$$

$$\frac{B}{A} = \frac{8388608 \times 0.01}{5} = \frac{8388608}{500}$$

■ Reference pulse frequency

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

■ Offset counter droop pulse

■ Set the position loop gain (K_p) to 30 (l/s).

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

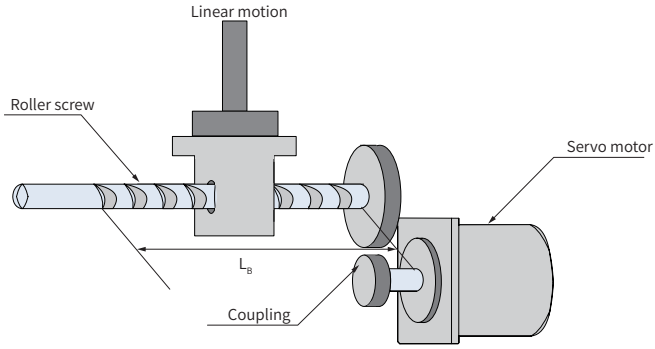
■ Electrical stop precision

$$\pm\Delta\varepsilon = \pm \frac{\varepsilon}{(\text{Servo drive control range}) \times \frac{n_M}{n_R}} = \pm \frac{833}{5000 \times \frac{3000}{3000}}$$

$= \pm 0.17 < \pm 1(pulse) \pm 0.01(mm/pulse)$

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

A.2 Capacity Selection Example for Position Control



Load speed (V_L): 15 m/min

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

Length of the ball screw (L_B): 0.8 m

Diameter of the ball screw (d_B): 0.04 m

Pitch of the ball screw (P_B): 0.01 m

Mass of the coupling (m_c): 1 kg

Outer diameter of the coupling (d_c) = 0.06 m

Times of feeding (n): 40/min

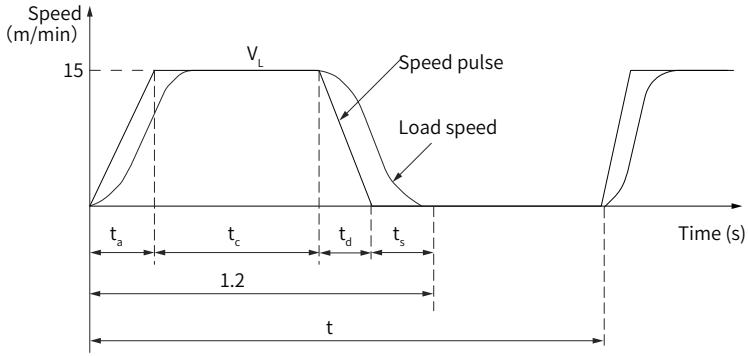
Length of feeding (L): 0.25 m

Feeding time (t_m): < 1.2s

Friction coefficient (μ): 0.2

Mechanical efficiency (η): 0.9 (90%)

■ **Speed diagram**



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

Set t_a to the same value as t_d.

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

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

■ Speed

■ Rotational speed of the load shaft

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

■ Rotational speed of the motor shaft

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

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

■ Load torque

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

■ Load moment of inertia

■ Rectilinear motion part

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

■ Ball screw

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

■ Coupling

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

■ Load moving power

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

■ Load acceleration power

$$P_a = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_L}{t_a} = \left(\frac{2\pi}{60} \times n_m\right)^2 \times \frac{J_C + J_B + J_{LI}}{t_a}$$

$$= \left(\frac{2\pi}{60} \times 1500\right)^2 \times \frac{34.22 \times 10^{-4}}{0.1} = 844\ (W)$$

■ Temporary settings of the servo motor

■ Selection condition

$T_L \leqslant$ Rated torque of the motor

$P_a + P_o$ = (1 to 2) x Rated output of the motor

$n_M \leqslant$ Rated speed of the motor

$J_L \leqslant$ Allowable load moment of inertia of the servo unit

Perform the following temporary selections according to preceding conditions:

Servo motor: MS1H3-85C15CD-A331Z

Servo drive: SV660PT5R4I

■ Specifications of the servo motor and servo drive

Rated output: 850 (W)

Rated speed: 1500 (rpm)

Rated torque: 5.39 (N·m)

Maximum transient torque: 13.8 (N·m)

Rotor moment of inertia: 13.0×10^{-4} (kg·m^2)

Allowable load moment of inertia: 69.58×10^{-4} (kg·m^2)

■ Confirmation of the servo motor selected temporarily

■ Confirm the starting torque required

$$T_p = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} + T_L = \frac{2\pi \times 1500 \times (13 + 34.22) \times 10^{-4}}{60 \times 0.1} + 0.277$$

$= 7.69(N \cdot m) <$ Maximum instantaneous torque…Satisfactory

■ Confirm the brake torque required

$$T_s = \frac{2\pi \times n_M \times (J_M + J_L)}{60 \times t_a} - T_L = \frac{2\pi \times 1500 \times (13 + 34.22) \times 10^{-4}}{60 \times 0.1} - 0.277$$

$= 7.14(N \cdot m) <$ Maximum instantaneous torque…Satisfactory

■ Confirm the effective torque value

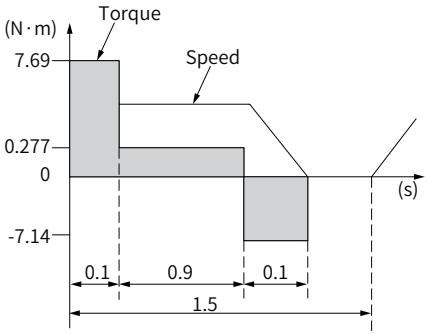
$$T_{rms} = \sqrt{\frac{T_p^2 \times t_a + T_L^2 \times t_c + T_s^2 \times t_d}{t}}$$

$$= \sqrt{\frac{(7.69)^2 \times 0.1 + (0.277)^2 \times 0.9 + (7.14)^2 \times 0.1}{1.5}}$$

$= 2.71(N \cdot m) < \text{Rated torque} \ldots \text{Satisfactory}$

■ Selection result

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

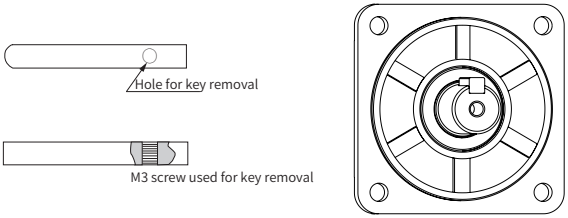


Appendix B: Disassembly of the Flat Key and Oil Seal

CAUTION
◆ Observe all the requirements presented in this chapter. Failure to comply may result in equipment fault or damage. ◆ Violent disassembly is not allowed. Take enough care during disassembly to prevent personal injury.

■ Removing the flat key

Standard MS1 series motors in 60, 80, and 130 frame sizes all adopt C-type plat keys with holes on the baseplate. To take the flat key out, select a proper bolt (inner hexagon bolt recommended) and an Allen wrench to screw down the bolt until the A-A end of the flat key is completely detached from the keyway. See the following figure for details.



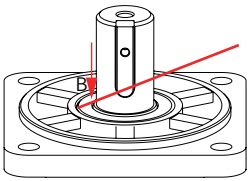
Specification of the key disassembly bolt		
Flange size	Dimensions of the flat key	Specifications of the disassembly bolt (Inner hexagon bolt)
40	Type-A flat key—A3x3x14	No disassembly hole
60	Type-C flat key—C5x5x16.5	M3 x 10 and above
80	Type-C flat key—C6x6x25	M3 x 15 and above
100	Type-C flat key—C8x7x35	M3 x 20 and above
130	Type-C flat key—C8x7x35	M3 x 20 and above
180	Type-C flat key—C10x8x64	M3 x 20 and above

■ Removing the oil seal

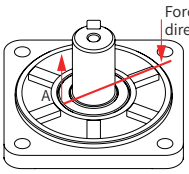
Tools needed: a pair of needle-nose pliers, a pair of slip-proof gloves, and a piece of cotton cloth.

Operating steps:

1) Step1: Put the cotton cloth on the supporting point B to avoid the end cover from being scratched during removal.
2) Step 2: Secure the motor and use the needle-nose pliers to hold point A of the oil seal lip.
3) Step 3: Pry the oil seal out gradually based on the supporting point B.



(Point B acts on the shaft extension stairs)



(Point A acts on the oil seal lip)

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