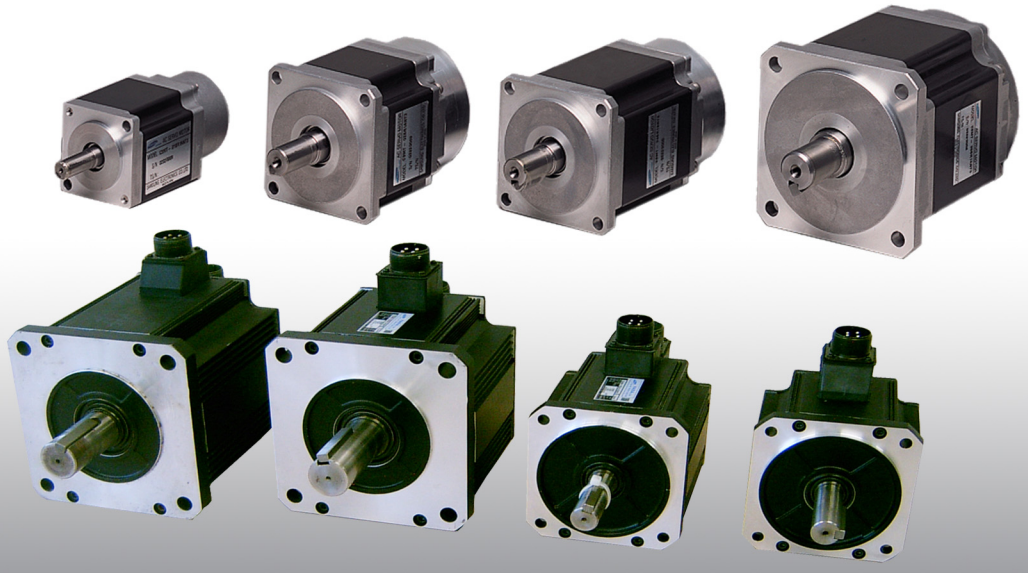
OEMAX™ CONTROLS

Maximum Value for OEMs℠



Servo Motor

User Manual

Disclaimer

The product explained in this document can be used for various applications. Because the product has various applications, all the users and administrators of the product should read and abide by all the relevant laws, regulations, and guidelines related to the operation and safety of the applications.

For direct or indirect damage that occurs while the user uses or applies the product, Rockwell Automation Korea Ltd. does not warrant or assume any responsibility.

The examples, illustrations, tables, and data in this document are included only for illustrative purposes. There are many variables and preconditions that must be met under the specific circumstances where the product is installed and used. Therefore, for direct or indirect results as well as the use of the examples, tables and the data presented in this document, Rockwell Automation Korea Ltd. does not warrant or assume any responsibility.

For the user's safety and efficient information transfer, this document uses the following symbols..

WARNING

Identifies information that could lead to slight injury, serious injury, death or economic loss if not followed accurately.

IMPORTANT

Identifies information that is important to understand in order to safely and correctly use the product.

ATTENTION

Identifies information that could lead to slight injury, serious injury, or economic loss if not followed accurately. But the consequences can become more serious depending on the circumstances.

Preface

The preface briefly introduces the manual.
The following contents are included in the preface.

- User of the Manual
- Purpose of the Manual
- Reference
- Symbols and Notations

User of the Manual

This user manual describes installation, specifications, motor capacity selection and maintenance and repair of all servo motors of Rockwell Automation Korea Ltd. This manual is made for the engineers who want to install, wire, and operate servo motors or apply them to a control system.

Those who do not have basic understanding of servo motors need to receive the product education provided by Rockwell Automation Korea Ltd. before using the product.

Purpose of the Manual

This manual explains the installation, specification, motor capacity selection, and maintenance and repair of servo motors. Necessary diagrams and other drawings are provided.

Reference

The following documents contain additional information concerning related servo motor products.

Usage	Manual	Document Number
CSD3 series servo drive installation, operation, maintenance and repair information	CSD3 Series Servo Drive User Manual	CSD3-UM001
CSD3 Plus series servo drive installation, operation, maintenance and repair information	CSD3 Plus Servo Drive User Manual	CSD3P-UM001
CSDJ Plus series servo drive installation, operation, maintenance and repair information	CSDJ Plus Servo Drive User Manual	CSDJ-UM001
CSDP Plus series servo drive installation, operation, maintenance and repair information	CSDP Plus Servo Drive User Manual	CSDPP-UM001
CSDP Plus servo drive installation information	CSDP Plus Servo Drive Installation Manual	CSDPP-IN001

You can view or download publications at http://www.oemax.co.kr or http://www.oemax.com. To order paper copies of technical documentaion, contact your local OEMax distributor or sales representatives.

Symbols and Notations

The following symbols and notations are used in this manual.

- Bullet points are used to provide multiple kinds of information. They are not used for sequential procedures.
- Numbers are used to provide sequential procedures or hierarchical information.

Safety Notice

Please read and understand the user manual before installation and operation. Please be aware of and abide by the following safety notices for the safety and protection of yourself and your property.

Use

ATTENTION

- Do not touch the inside of the servo drive.
- Make sure that the servo drive and the motor are fully grounded.
- Do not put excessive stress on the motor power and encoder cable.
- Never touch the revolving part of the motor during operation Station No.

WARNING

- Avoid using the product near wet places or corrosive and inflammable materials.
- Operate the system with no load during pilot operation.

Storage

WARNING

- Do not store the product near wet places, rain, toxic gas or fluid.
- Keep the product out of the direct rays of the sun and store it within the storage temperature and humidity ranges.
- Avoid overloading if the product is stored in a warehouse.

Transportation

WARNING

- Do not carry the product by holding the cable and the motor shaft.

Installation and Wiring

ATTENTION

- When installing and wiring servo motor, refer to the user guide of the model and take necessary actions.

Maintenance and Repair

WARNING

- Do not disassemble or remodel the product. Any damage caused after the user disassembles or remodels the product will be excluded from the company's warranty.
- The company bears no responsibility for injuries or physical damage caused by remodeling of this product.
- In case of a failure that cannot be dealt with, please contact the local OEMax distributor or sales representatives.

Contents

Chapter 4

Motor Diagram and Dimensions

Chapter 5

Cable Specifications

Chapter 6

Load Calculation

Overview

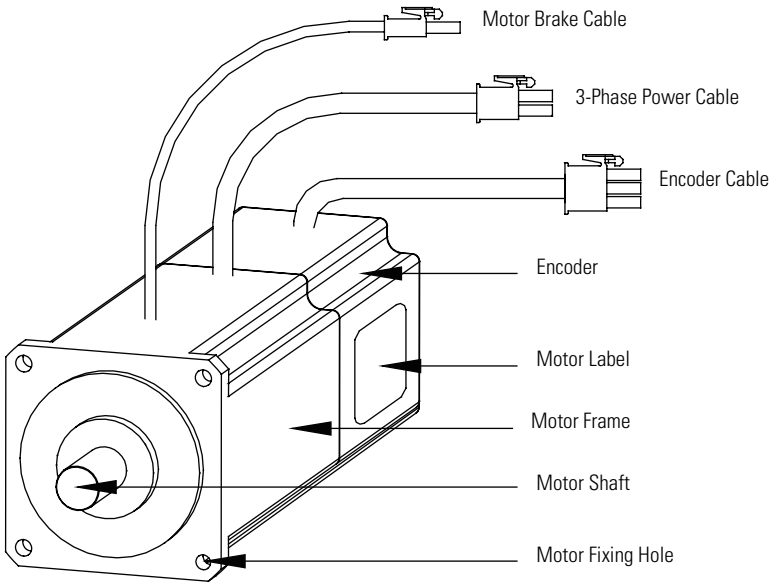
This chapter describes general facts about servo motors, such as a name of each part and its label format.

Name of Each Part of Servo Motor

The figure below shows a name of each part of a motor

Motors that are not equipped with brakes do not have any brake cables. The name of each part can be different from what is shown in the figure below depending on motor model.

NOTE For further information about a servo drive, refer to the user manual of the corresponding servo drive.



NOTE

For specifications and order codes for the following cables, refer to "Cable Specifications" in Chapter 5.

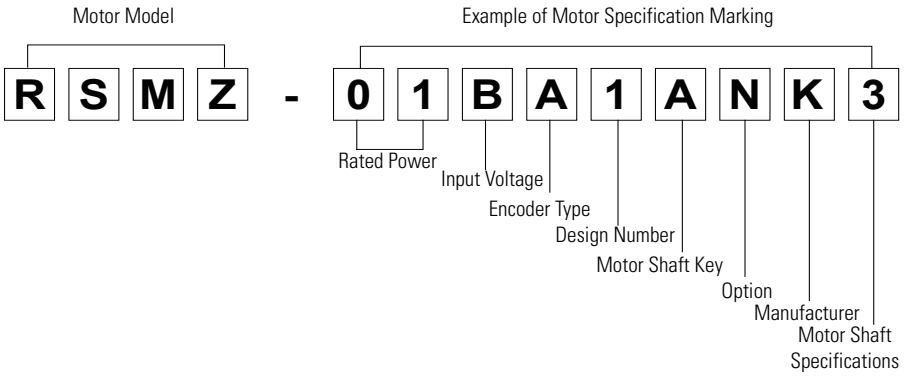
- 3-Phase Power Cable
- Encoder Cable
- Motor Brake Cable

For specifications and order codes of the following cables, refer to the user manual of the servo drive you purchased.

- I/O Cable
- Communication Cable

Servo Motor Label Format

The figure below shows the model name format on the label.



The table below shows examples of possible markings on the label of a servo motor. (Excluding design number and manufacturer name.)

Table 1.1 Motor Model

Marking (Available motor models)	
CSM	RSMD
CSMD	RSMF
CSMH	RSMH
CSMK	RSMK
CSMQ	RSML
CSMR	RSMS
CSMS	RSMQ
CSMT	RSMZ
CSMZ	

Table 1.2 Rated Power

Symbol	Meaning
A3	30 W
A5	50 W
01	100 W
02	200 W
04	400 W
⋮	⋮
10	1 kW
⋮	⋮
50	5 kW

Table 1.3 Input Voltage

Symbol	Meaning
B	AC 220V

Table 1.4 Encoder Type

Motor Model	Symbol	Resolution/1 Rotation	Encoder Type
CSMR/T RSMD/F/H/K/L/Q/S/Z	Q	131072	Abs. Serial
	R	131072	Serial Inc.

Motor Model	Symbol	Pulse/1 Rotation	Encoder Type
CSM CSMR/T	S	2048	15 Wire Inc.
	B	2048	9 Wire Inc.
	A	2048	Abs. Value
	D	2500	15 Wire Inc.
	C	2000	15 Wire Inc.
	K	5000	15 Wire Inc.
CSMD/H/K/Q/S/Z	A	2500	11 Wire Inc.
	H	2048	Compact Abs. Value
	M	10000	15 Wire Inc.
	K	5000	15 Wire Inc.
	L	6000	15 Wire Inc.
RSMD/F/H/K/L/Q/S/Z	A	2500	9 Wire Inc.
	H	2048	Compact Abs. Value
	M	10000	15 Wire Inc.

Table 1.5 Motor Shaft Key

Symbol	Meaning
A	Key Present
B	Key Absent

Table 1.6 Option

Symbol	Meaning
N	Option Absent
B	Brake Present
S	Oil Seal Present
T	Brake and Oil Seal Present

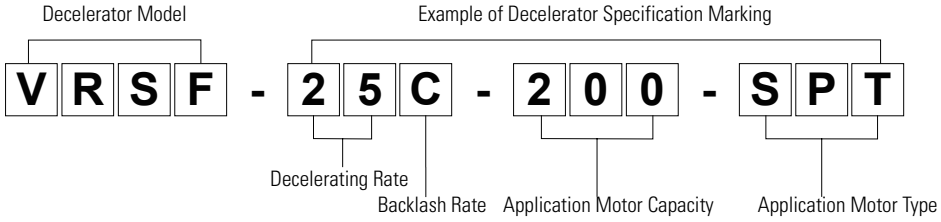
Table 1.7 Motor Shaft Specifications

Symbol	Meaning
1	Circle (Coupling Lock)
2	2-Side Slice (Set Screw Lock)
3	Key Lock
4	Tapper Lock
5	General Decelerator Installed
6	Harmonic Drive Installed

Decelerator Label Format

The figure below shows the model name format on the label of the decelerator.

The decelerator can only be installed on CSM and CSMT motors.



The table below shows examples of possible markings on the label of a decelerator. (Excluding decelerator model.)

Table 1.8 Option

Symbol	Decelerating Rate
03	1/3
05	1/5
09	1/9
15	1/15
25	1/25

Table 1.9 Backlash Rate(1)

Symbol	Meaning
B	0.7 degree
C	0.5 degree
D	
E	

(1) The backlash class of a decelerator is fixed at the factory.

Table 1.10 Application Motor Capacity

Symbol	Meaning
030	30 W
050	50 W
⋮	⋮
800	800 W

Table 1.11 Application Motor Type

Symbol	Meaning
SPT	CSM, CSMT

Installation

This chapter describes what you should know when installing a servo motor. For the dimensional data necessary for installation, See "Motor Specifications" in Chapter 3 and "Motor Diagram and Dimensions" in Chapter 4. For the dimensional data of a servo drive and its peripherals, See the user manual of the corresponding servo drive.

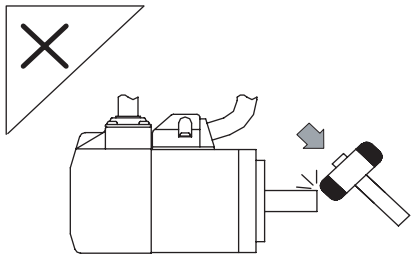
Servo Motor Installation

Precautions for Installation

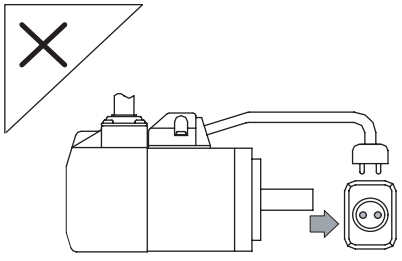
Install a servo motor following the cautions below.

A motor is a precision device. Treat encoders, motors shafts and bearings with special care.

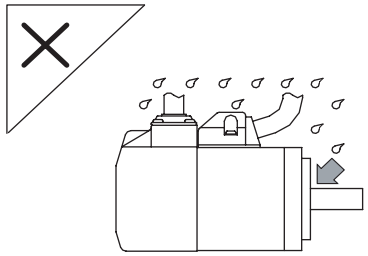
- Shock is a major cause of performance degradation of a motor.



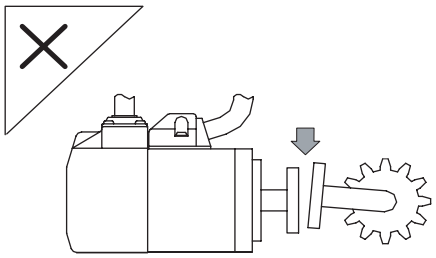
- Do not connect the motor directly to a power supply.



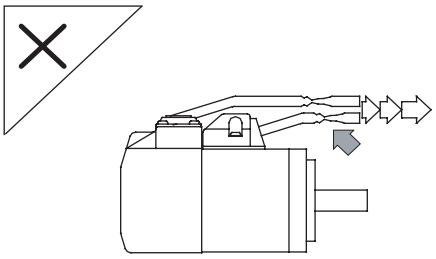
- Keep the motor away from water or oil.



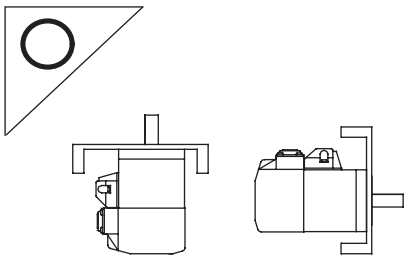
- Check the concentricity of coupling connected to load with special care.



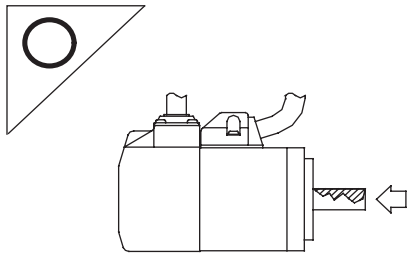
- Do not put the electric wires under constant stress.



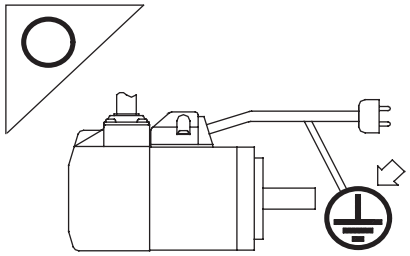
- Mounting is possible either horizontally or vertically.



- The shaft is oiled for corrosion prevention. Remove the oil before installation.



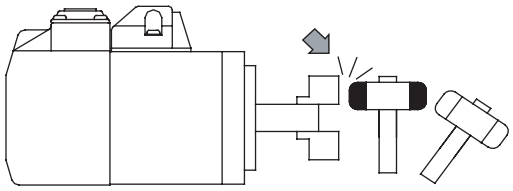
- Please connect the grounding line of the motor to the grounding connection terminal of the drive.



Coupling Assembly

Avoid excessive shock.

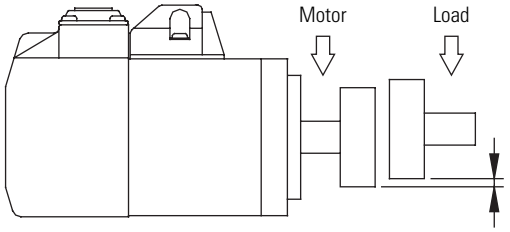
Excessive shock during assembling of coupling can damage the encoder. Use coupling assembly tools to facilitate the assembly process.



Load Connection

Align connection axes of a motor and a load with each other.

Measure the concentricity of a motor shaft and a load shaft after assembling the coupling. Measure at four points rotating it by 90 degrees, and adjust them so that the difference of maximum and minimum values does not exceed 0.03mm.



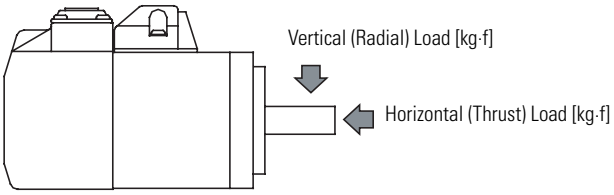
ATTENTION

Misalignment of the motor and load axes is a main cause of performance degradation.

Allowed Load on Motor Shaft

Make sure that the force exerted on the motor shaft is within the allowed load.

For allowed load on motor shaft for each model, See "Allowed Load on Motor Shaft" on page 3-58.



Servo Motor Installation Environment

Environmental requirements for a servo motor are as follows:

Table 2.1 Servo Motor Installation Specifications

Item	Condition
Storage Temperature	-20 to 60 °C
Operating Temperature	0 to 55 °C
Operating Humidity	RH 90% or less, non-condensing
Installation Site	The installation site needs to meet the following conditions. • Indoors • Good ventilation • Easy to check and clean. • No explosive gas.

Installation of Servo Drive

NOTE For further information on installation and dimensional data of a servo drive, refer to the user manual of the drive.

Motor Specifications

This chapter describes common and basic specifications, speed torque curves, and brake specifications of each servo motor series. Allowed load data on a motor shaft is described in a separate section.

NOTE As for specifications of a servo drive, refer to the user manual of the servo drive.

CSMD Series Motor

Common Specifications

Table 3.1 CSMD Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	49 m/s^2
Impact	98 m/s^2
Time Rated	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Basic Specifications

Table 3.2 CSMD Series Motor Basic Specifications

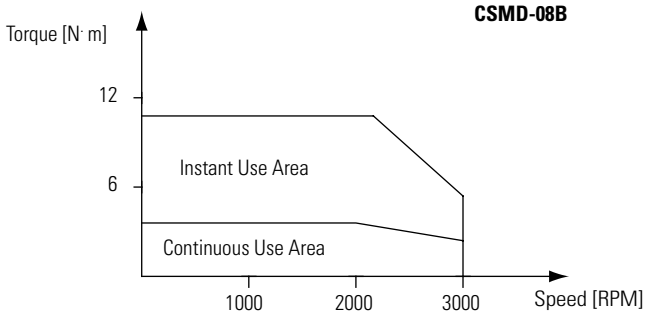
		CSMD-									
		08B	**10B**	**15B**	**20B**	**25B**	**30B**	**35B**	**40B**	**45B**	**50B**
Rated Voltage	V	220									
Rated Power	kW	0.75	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Rated Torque	Kgf· cm N· m	36.4 3.57	49 4.8	73 1.15	97.4 9.54	121 11.86	146 14.3	169 16.6	192 18.8	219 21.4	243 23.8
Maximum Instant Torque	Kgf· cm N· m	109 10.7	147 14.4	219 21.5	292 28.5	363 35.6	438 42.9	510 50.0	576 56.4	657 64.3	729 71.4
Rated Revolving Speed	RPM	2000									
Maximum Revolving Speed	RPM	3000									
Rotor Inertia	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	2.88 2.82	6.30 6.17	11.4 11.2	15.5 15.2	19.6 19.2	22.8 22.3	36.6 35.9	43.4 42.5	51.6 50.6	61.9 60.7
Rotor Inertia (When Brake is Attached)	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	3.19 3.13	6.93 6.17	13.6 12.3	17.0 16.7	21.5 21.1	25.1 24.6	41.0 40.2	47.8 46.8	56.7 55.6	68.1 66.7
Power Rate	kW/s	45.1	37.3	45.8	60.0	73.2	91.6	76	83.2	91.1	93.5
Mechanical Time Constant	ms	0.5	0.7	0.81	0.75	0.72		1.0			0.9
Electric Time Constant	ms	15.7	18	19	21		20	24		30	32
Rated Current	A (rms)	5.0	5.6	9.4	12.3	14	17.8	18.7	23.4	26.2	28
Maximum Instant Current	A (rms)	21	24	28.2	36.9	42	53.4	56.1	70.2	78.6	84
Space in Shaft Direction (Max.)	mm	0.3									
Weight (When Brake is Attached)	Kg	4.8 6.5	6.8 8.7	8.5 10.1	10.6 12.5	12.8 14.7	14.6 16.5	16.2 18.7	18.8 21.3	21.5 25	25 28.5
Revolving Direction		U→V→W: CW									
Color		Black									
Oil Seal		Embedded									

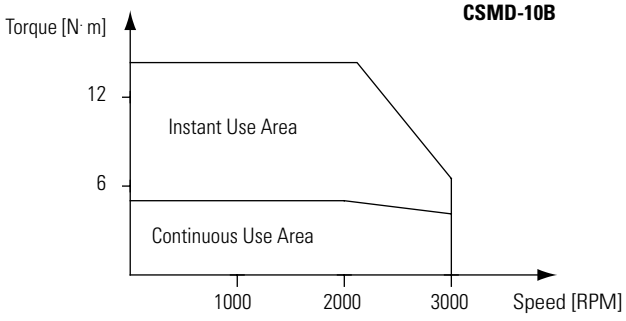
Brake Specifications

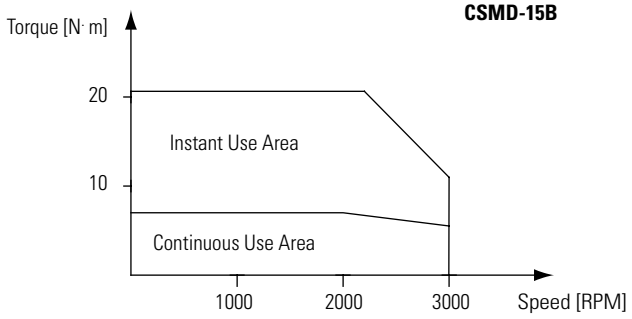
Table 3.3 CSMD Motor Brake Specifications

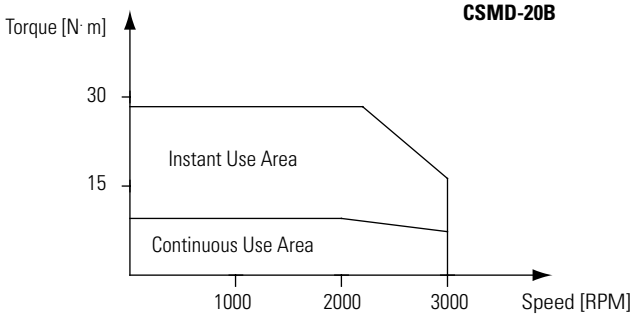
		CSMD-					
		08B	**10B**	**15B, 20B**	**25B, 30B**	**35B, 40B**	**45B, 50B**
Stiction Torque	N·m Kgf·cm	7.84 or more 80	4.9 or more 50	13.7 or more 140	16.1 or more 165	21.5 or more 220	24.5 or more 250
Rotor Inertia	$Kg \cdot m^2 \cdot 10^{-4}$ $Kg \cdot cm \cdot s^2$	0.33 0.34	1.35 1.38			4.25 4.34	9.0 9.18
Brake Pull-in Time	ms	50 or less	80 or less	100 or less	110 or less	90 or less	80 or less
Brake Release Time	ms	15 or less	70 or less	50 or less		35 or less	25 or less
Release Voltage	VDC	2 or more					
Rated Voltage	VDC	24 ± 2.4					
Rated Current	A	0.81 ± 10%	0.59 ± 10%	0.79 ± 10%	0.90 ± 10%	1.1 ± 10%	1.3 ± 10%
Allowed Brake Energy: once	J Kgf·m	392 40	588 60	1176 120	1470 150	1078 110	1372 140
Overall Allowed Brake Energy	J Kgf·m	4.9×10^5 5×10^4	7.8×10^5 8×10^4	1.5×10^6 1.5×10^5	2×10^6 2.2×10^5	2.4×10^6 2.5×10^5	2.9×10^6 3×10^5

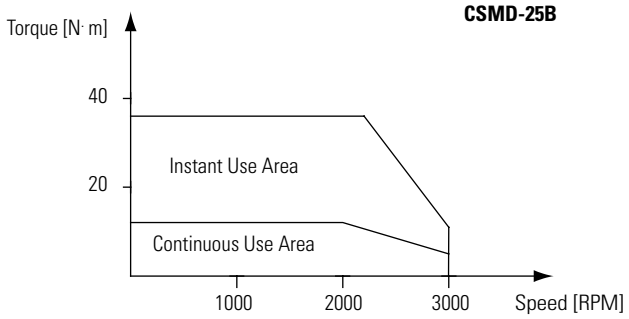
Speed Torque Curve

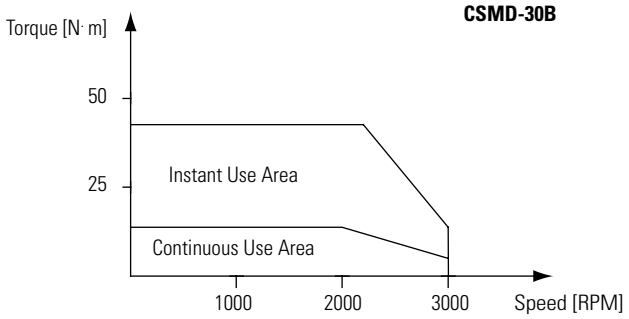


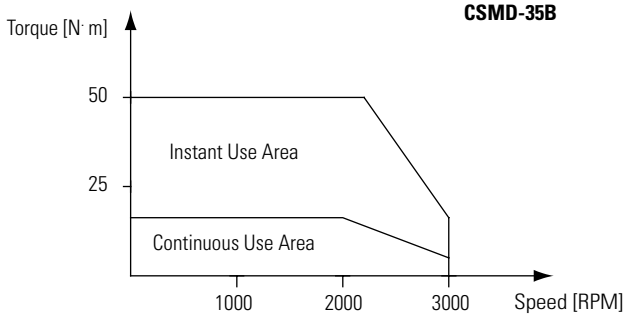


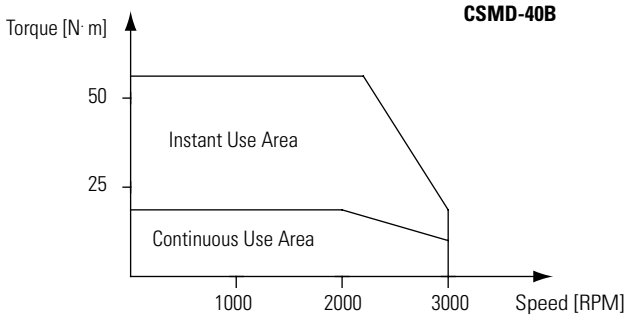


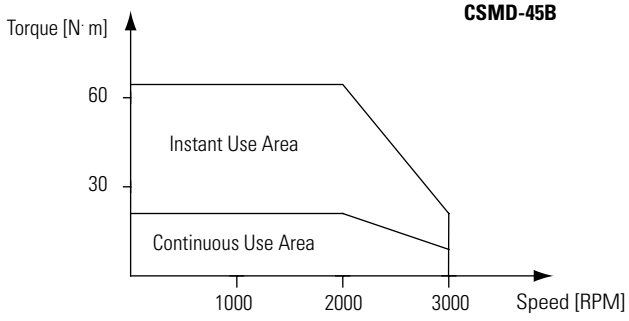


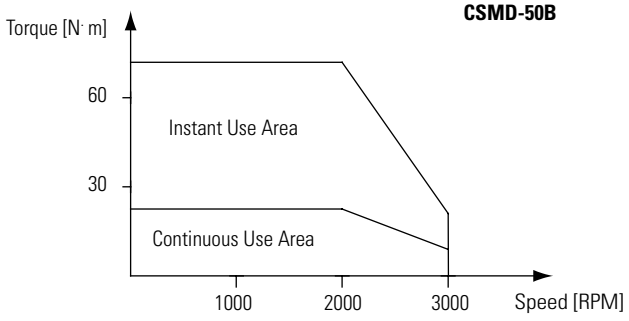

CSMD-25B
Torque [N· m]
40
20
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed [RPM]


CSMD-30B
Torque [N· m]
50
25
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed [RPM]


CSMD-35B
Torque [N· m]
50
25
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed [RPM]


CSMD-40B
Torque [N· m]
50
25
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed [RPM]


CSMD-45B
Torque [N· m]
60
30
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed [RPM]


CSMD-50B
Torque [N· m]
60
30
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed [RPM]

CSMF Series Motor

Common Specifications

Table 3.4 CSMF Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	49 m/s^2
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
When Brake is Attached	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Basic Specifications

Table 3.5 CSMF Series Motor Basic Specifications

		CSMF-					
		04B	08B	15B	25B	35B	45B
Rated Voltage	V	220					
Rated Power	kW	0.4	0.75	1.5	2.5	3.5	4.5
Rated Torque	Kgf·cm N·m	19.5 1.91	36.4 3.57	73 7.15	121 11.86	169 16.56	219 21.46
Maximum Instant Torque	Kgf·cm N·m	58.5 5.3	109 10.68	219 21.46	310 30.38	450 44.1	560 54.88
Rated Revolving Speed	RPM	2000					
Maximum Revolving Speed	RPM	3000					
Rotor Inertia	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	2.50 2.45	10.3 10.1	20.5 20.1	42.1 41.3	52.7 51.6	73.8 72.3
Rotor Inertia (When Brake is Attached)	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	2.8 2.7	11.1 10.9	21.9 21.9	46.2 45.3	56.8 55.7	80.1 78.5
Power Rate	kW/s	14.9	12.6	25.5	34	53.1	63.7
Mechanical Time Constant	ms	1.2	1.9	1.4	1.3	1.06	0.88
Electric Time Constant	ms	14	21	25	35	41	

Table 3.5 CSMF Series Motor Basic Specifications

Rated Current	A (rms)	2.8	5.0	9.5	13.4	20	23.5
Maximum Instant Current	A (rms)	12	21	40	57	84	100
Space in Shaft Direction (Max.)	mm	0.3					
Weight (When Brake is Attached)	Kg	4.7 6.7	8.6 10.6	11 14	14.8 17.5	15.5 19.2	19.9 24.3
Revolving Direction		U→V→W: CW					
Color		Black					
Oil Seal		Embedded					

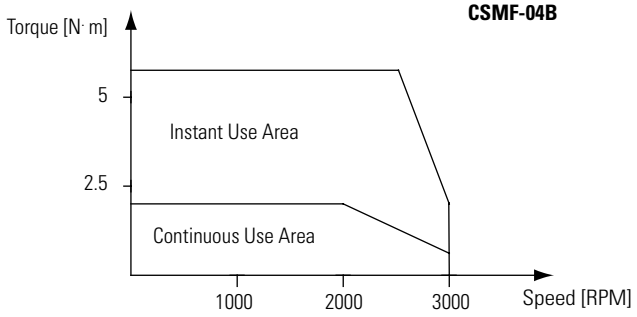
Brake Specifications

Table 3.6 CSMF Series Motor Brake Specifications

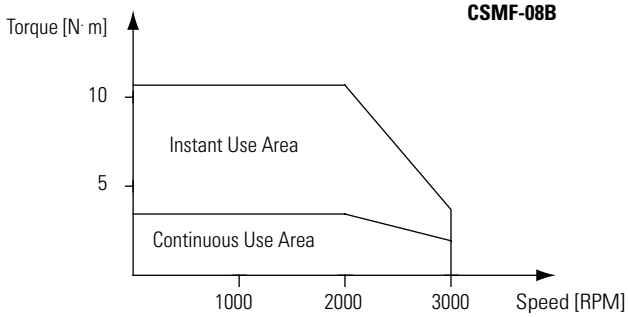
		CSMF-			
		04B	**08B, 15B**	**25B, 35B**	**45B**
Stiction Torque	N·m Kgf·cm	4.9 or more 50	7.8 or more 80	21.6 or more 220	31.4 or more 320
Rotor Inertia	$Kg \cdot m^2 \cdot 10^{-4}$ $Kg \cdot cm \cdot s^2$	1.35 1.38	4.7 9.2	8.75 8.9	8.75 8.9
Brake Pull-in Time	ms	80 or less		150 or less	
Brake Release Time	ms	70 or less	35 or less	100 or less	
Release Voltage	VDC	2 or more			
Rated Voltage	VDC	24±2.4			
Rated Current	A	0.59 ± 10%	0.83 ± 10%	0.75 ± 10%	
Allowed Brake Energy: once	J Kgf·m	588 60	1372 140	1470 150	
Overall Allowed Brake Energy	J Kgf·m	7.8×10^5 8×10^4	2.9×10^6 3×10^5	1.5×10^6 1.5×10^5	2.2×10^6 2.2×10^5

Speed Torque Curve

CSMF-04B



CSMF-08B



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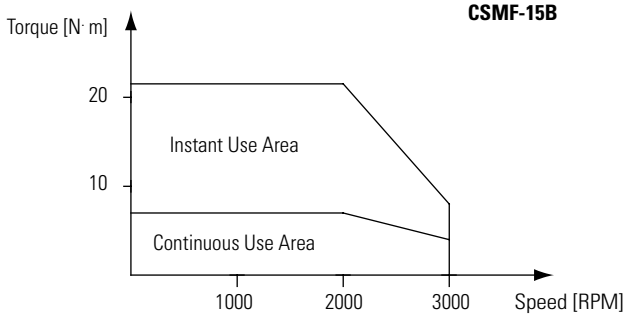

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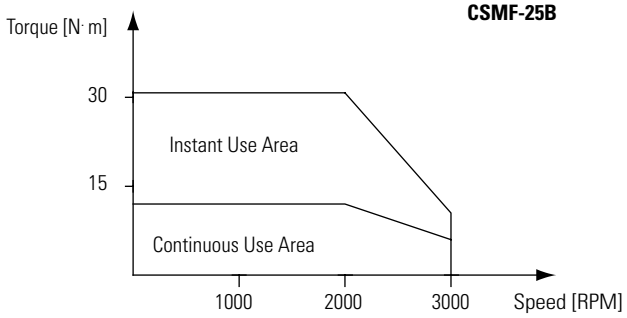

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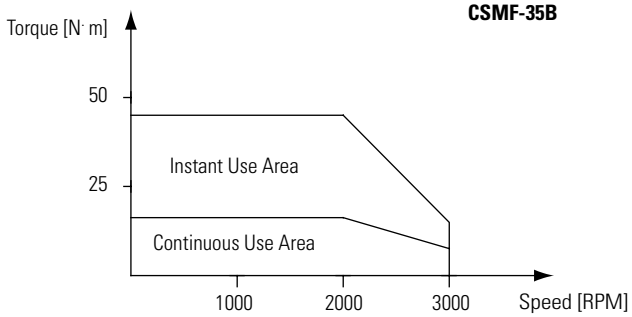

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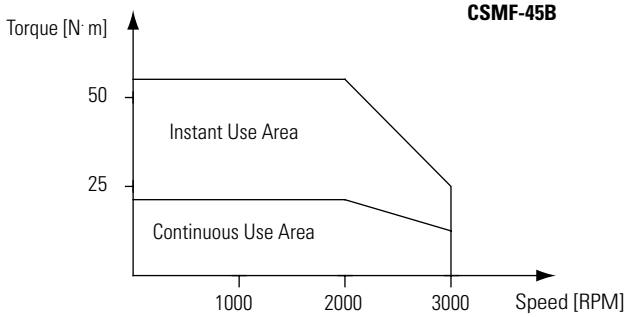


CSMH Series Motor

Common Specifications

Table 3.7 CSMH Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	49 m/s^2
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
When Brake is Attached	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Basic Specifications

Table 3.8 CSMH Series Motor Basic Specifications

		CSMH-						
		05B	10B	15B	20B	30B	40B	50B
Rated Voltage	V	220						
Rated Power	kW	0.5	1	1.5	20	30	40	50
Rated Torque	Kgf· cm N· m	24.3 2.38	49 4.8	73 7.15	97.4 9.54	146 14.31	192 18.8	243 23.8
Maximum Instant Torque	Kgf· cm N· m	61.0 6.0	147 14.4	219 21.5	292 28.5	483 42.9	576 56.4	729 71.4
Rated Revolving Speed	RPM	2000						
Maximum Revolving Speed	RPM	3000						
Rotor Inertia	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	14.3 14.0	26.5 26.0	43.8 42.9	63.3 62.0	96.0 94.1	122.4 120.0	173.5 170.0
Rotor Inertia (When Brake is Attached)	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	15.5 15.2	27.8 27.2	45.0 44.1	69.3 67.9	102 100.0	128.6 126.0	179.6 176.0
Power Rate	kW/s	4.0	8.9	11.9	14.7	21.8	29.5	33.4
Mechanical Time Constant	ms	4	2.9	3.1	2.1	2.5	2.2	2.3
Electric Time Constant	ms	15	18	19	26		30	31

Table 3.8 CSMH Series Motor Basic Specifications

Rated Current	A (rms)	3.2	5.6	9.4	12.3	17.8	23.4	28.0
Maximum Instant Current	A (rms)	11.5	24	40	52	76	100	120
Space in Shaft Direction (Max.)	mm	0.3						
Weight (When Brake is Attached)	Kg	5.3 6.9	8.9 9.5	10.0 11.6	16.0 19.5	18.2 21.7	22.0 25.5	26.7 30.2
Revolving Direction		U→V→W: CW						
Color		Black						
Oil Seal		Embedded						

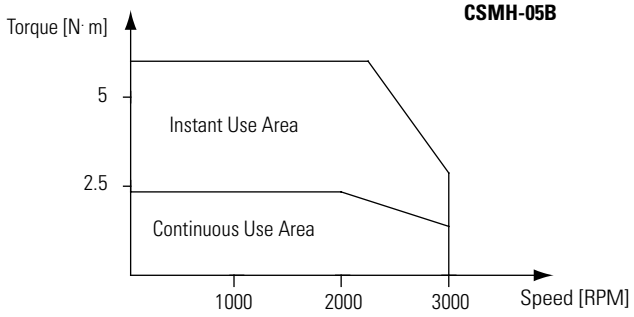
Brake Specifications

Table 3.9 CSMH Series Motor Brake Specifications

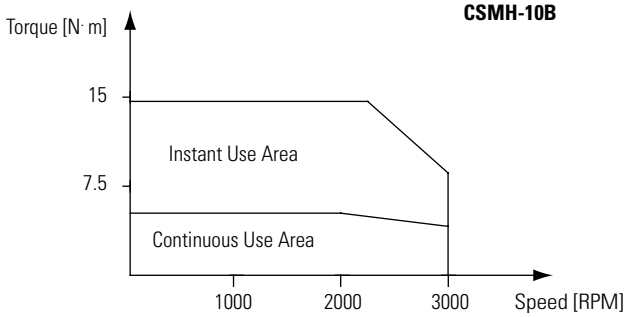
		CSMH-		
		05B, 10B	**15B**	**20B, 30B, 40B, 50B**
Stiction Torque	N·m Kgf·cm	4.9 or more 50	13.7 or more 140	24.5 or more 250
Rotor Inertia	$Kg·m^2·10^{-4}$ $Kg·cm·s^2$	1.35 1.38		9.0 9.18
Brake Pull-in Time	ms	80 or less	100 or less	80 or less
Brake Release Time	ms	70 or less	50 or less	25 or less
Release Voltage	VDC	2 or more		
Rated Voltage	VDC	24±2.4		
Rated Current	A	0.59 ± 10%	0.79 ± 10%	1.3 ± 10%
Allowed Brake Energy: once	J Kgf·m	588 60	1176 120	1372 140
Overall Allowed Brake Energy	J Kgf·m	7.8×10^5 8×10^4	1.5×10^6 3×10^5	2.9×10^6 1.5×10^5

Speed Torque Curve

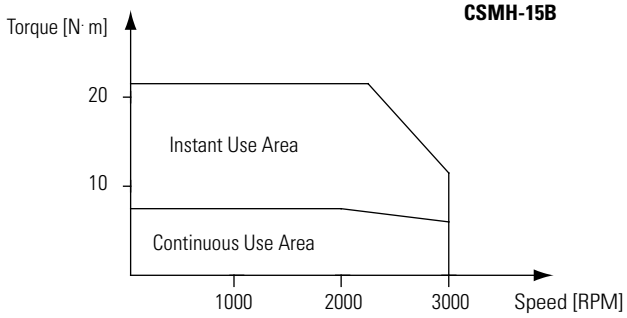
CSMH-05B



CSMH-10B



CSMH-15B



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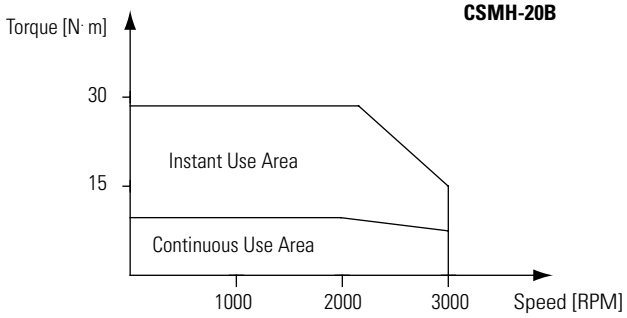

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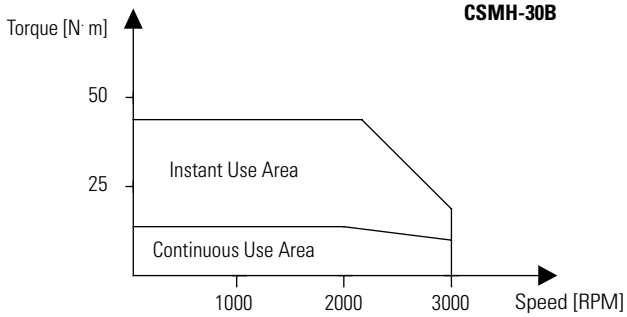

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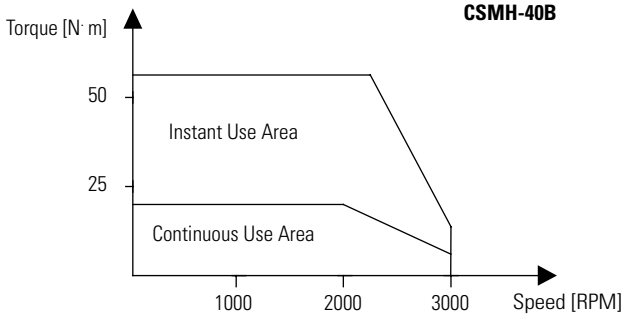
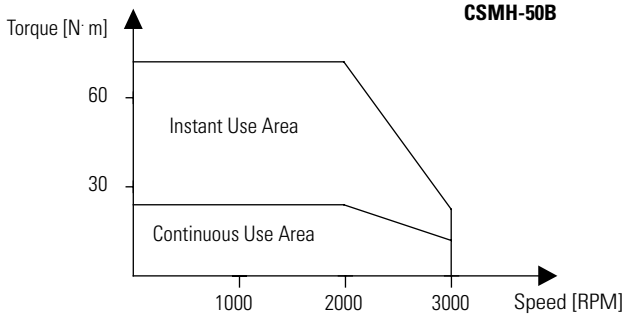


CSMH-50B



CSMK Series Motor

Common Specifications

Table 3.10 CSMK Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	49 m/s^2
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
When Brake is Attached	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Basic Specifications

Table 3.11 CSMK Series Motor Basic Specifications

		CSMK-							
		03B	06B	09B	12B	20B	30B	45B	60B
Rated Voltage	V	220							
Rated Power	kW	0.3	0.6	0.9	1.2	2.0	3.0	4.5	6.0
Rated Torque	Kgf·cm N·M	28.9 2.84	58.1 5.7	87.9 8.62	117.2 11.5	195 19.1	289.5 28.4	437.4 42.9	583.2 57.2
Maximum Instant Torque	Kgf·cm N·M	64.3 6.3	146.8 14.4	196.8 19.3	285.5 28.0	448.6 44.0	649.5 63.7	1091 107	1320 129
Rated Revolving Speed	RPM	1000							
Maximum Revolving Speed	RPM	2000							
Rotor Inertia (When Brake is Attached)	$Kg·m^2·10^{-4}$	3.9 5.1	6.17 7.45	11.2 12.3	30.4 36.2	35.5 41.4	55.7 61.7	80.9 89.2	99 108
Power Rate (When Brake is Attached)	kW/s	20.7	52.7	66.3	43.3 36.3	103 88.3	145 131	228 207	331 304
Mechanical Time Constant (When Brake is Attached)	ms	1.4	0.81	0.88	1 1.2	0.97 1.1	0.74 0.82	0.70 0.78	0.9 0.98
Electric Time Constant	ms	14	17	20	26	25	30	31	33
Rated Current	A (rms)	3	5.7	7.6	11.6	18.5	24	33	47

Table 3.11 CSMK Series Motor Basic Specifications

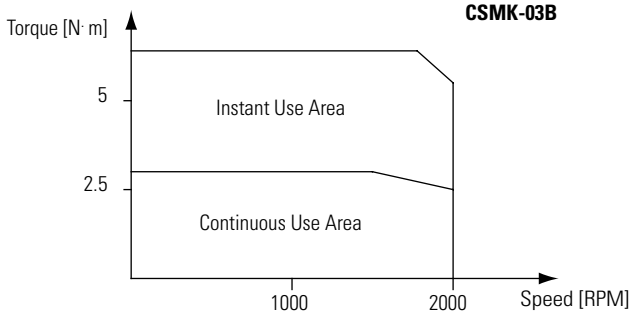
Maximum Instant Current	A (rms)	11	21	24	40	60	80	118	155
Space in Shaft Direction (Max.)	mm	0.3							
Weight (When Brake is Attached)	Kg	5.1 6.7	6.8 8.4	8.5 10	15.5 19	17.5 21	25 28.5	34 39.5	41 46.5
Revolving Direction		U→V→W: CW							
Color		Black							
Oil Seal		Embedded							

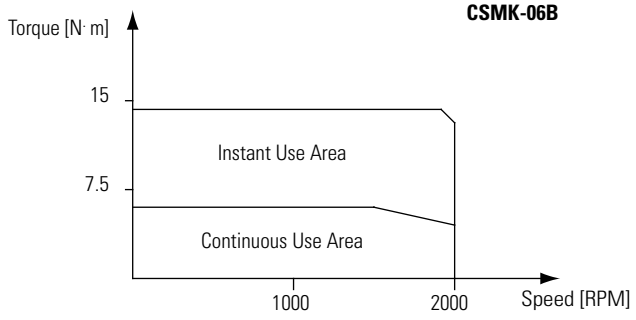
Brake Specifications

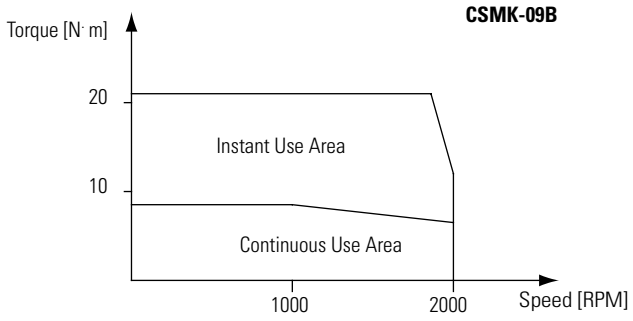
Table 3.12 CSMK Series Motor Brake Specifications

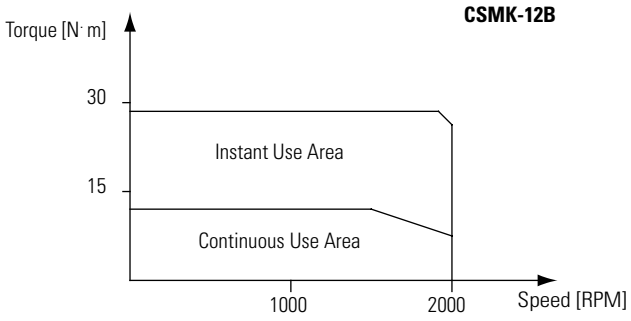
		CSMK-			
		03B	**06B, 09B**	**12B, 20B**	**30B, 45B, 60B**
Stiction Torque	N·m Kgf·cm	4.9 or more 50	11.8 or more 120	24.5 or more 250	58.8 or more 600
Rotor Inertia	$Kg \cdot m^2 \cdot 10^{-4}$ $gf \cdot cm \cdot s^2$	1.35 1.38		4.7 4.7	
Brake Pull-in Time	ms	80 or less			150 or less
Brake Release Time	ms	70 or less	15 or less	25 or less	50 or less
Release Voltage	VDC	2 or more			
Rated Voltage	VDC	24 ± 2.4			
Rated Current	A	0.59 ± 10%	0.81 ± 10%	1.3 ± 10%	1.4 ± 10%
Allowed Brake Energy	J	60	40	140	
Overall Allowed Brake Energy	J	8×10^4	5×10^4	3×10^5	3×10^4

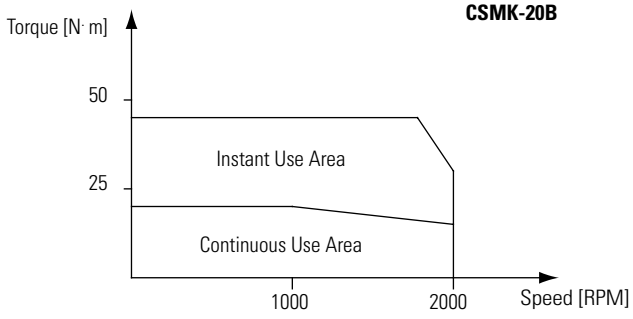
Speed Torque Curve

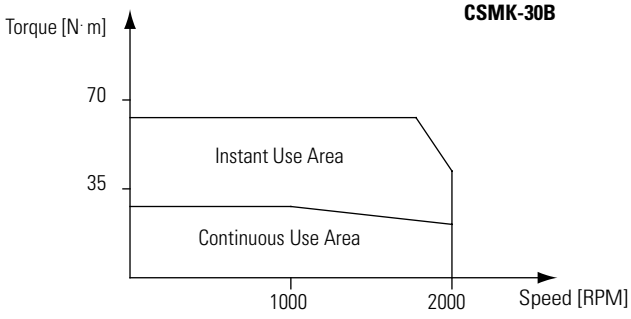


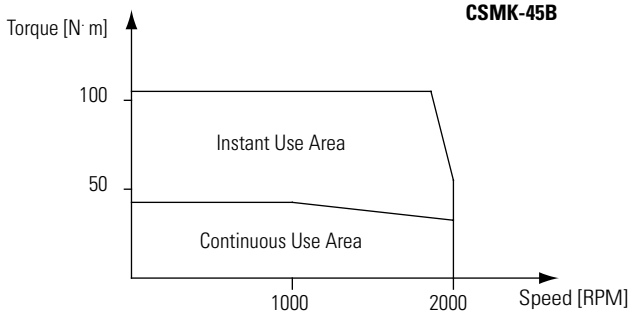



CSMK-09B
Torque [N· m]
20
10
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]


CSMK-12B
Torque [N· m]
30
15
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]


CSMK-20B
Torque [N· m]
50
25
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]


CSMK-30B
Torque [N· m]
70
35
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]


CSMK-45B
Torque [N· m]
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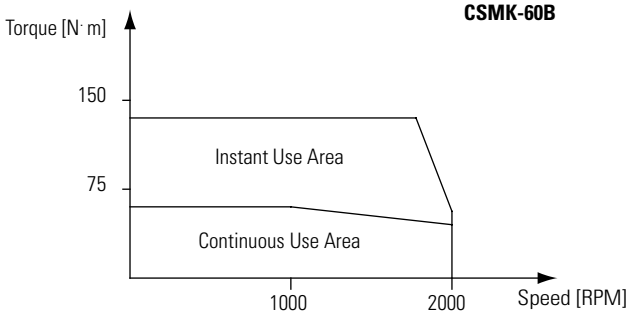
50
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]


CSMK-60B
Torque [N· m]
150
75
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]

CSMQ Series Motor

Common Specifications

Table 3.13 CSMQ Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	49 m/s^2
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
When Brake is Attached	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Basic Specifications

Table 3.14 CSMQ Series Motor Basic Specifications

		CSMQ-		
		01B	02B	04B
Rated Voltage	V	220		
Rated Power	kW	0.1	0.2	0.4
Rated Torque	Kgf·cm N·M	3.24 0.318	6.5 0.637	13 1.274
Maximum Instant Torque	Kgf·cm N·M	9.7 0.95	19.5 1.911	39 3.822
Rated Revolving Speed	RPM	3000		
Maximum Revolving Speed	RPM	5000		
Rotor Inertia	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	0.09 0.09	0.35 0.34	0.65 0.64
Rotor Inertia (When Brake is Attached)	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	0.12 0.12	0.43 0.42	0.73 0.72
Power Rate (When Brake is Attached)	kW/s	11.4	11.8	25.5
Mechanical Time Constant	ms	0.95	0.79	0.59
Electric Time Constant	ms	2.9	5.6	6.6

Table 3.14 CSMQ Series Motor Basic Specifications

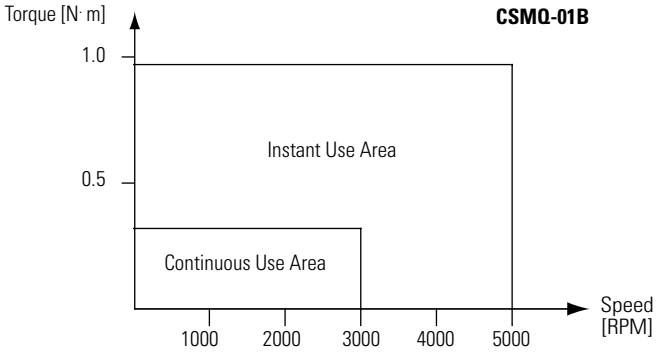
Rated Current	A (rms)	1.0	1.6	2.5
Maximum Instant Current	A (rms)	4.3	6.8	10.5
Space in Shaft Direction (Max.)	mm	0.3		
Weight	Kg	0.65	1.3	1.8
Revolving Direction		U→V→W: CW		
Color		Black		
Oil Seal		Optional Specifications		

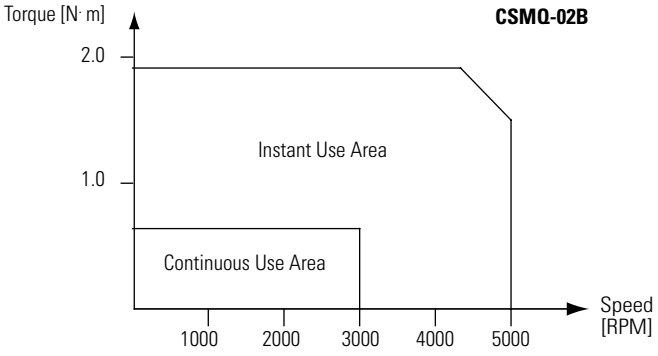
Brake Specifications

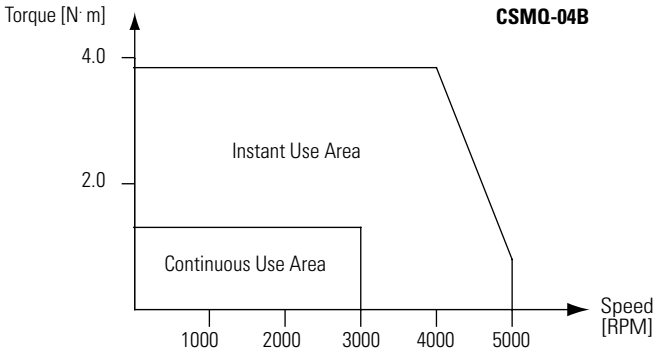
Table 3.15 CSMQ Series Motor Brake Specifications

		CSMQ-	
		01B	**02B, 04B**
Stiction Torque	N·m Kgf·cm	0.29 or more 3	1.27 or more 13
Rotor Inertia	$Kg \cdot m^2 \cdot 10^{-4}$ $gf \cdot cm \cdot s^2$	0.03 0.03	0.09 0.09
Brake Pull-in Time	ms	50 or less	60 or less
Brake Release Time	ms	15 or less	
Release Voltage	VDC	1 or more	
Rated Voltage	VDC	24 ± 2.4	
Rated Current	A	0.29	0.41
Allowed Brake Energy	J Kgf·m	137 14	196 20
Overall Allowed Brake Energy	J Kgf·m	44.1×10^3 4500	147×10^3 15000

Speed Torque Curve







CSMR Series Motor

Common Specifications

Table 3.16 CSMR Series Motor Common Specifications

Item	**Specifications**
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	49 m/s^2
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
When Brake is Attached	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Basic Specifications

Table 3.17 CSMR Series Motor Basic Specifications

		CSMR-		
		01B	**02B**	**04B**
Rated Voltage	V	220		
Rated Power	kW	0.1	0.2	0.4
Rated Torque	Kgf·cm N·M	3.25 0.318	6.5 0.64	13 1.27
Maximum Instant Torque	Kgf·cm N·M	9.7 0.95	19.5 1.91	39 3.82
Rated Revolving Speed	RPM	3000		
Maximum Revolving Speed	RPM	5000		
Rotor Inertia	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	0.09 0.09	0.30 0.30	0.57 0.56
Rotor Inertia (When Brake is Attached)	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	0.19 0.19	0.53 0.53	0.80 0.79
Power Rate	kW/s	11.5	13.8	29.1
Mechanical Time Constant	ms	1.2	1.0	0.6
Electric Time Constant	ms	2.5	3.2	4.8

Table 3.17 CSMR Series Motor Basic Specifications

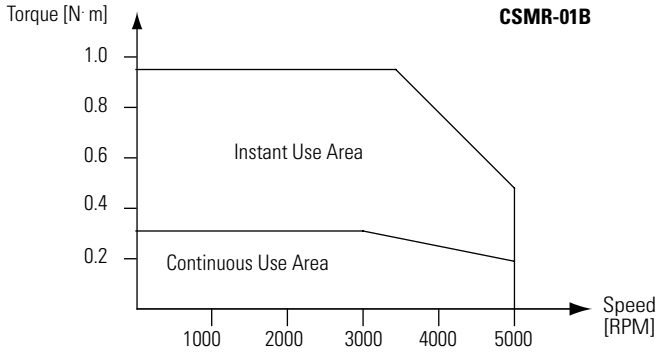
Shaft Stiction Torque (Max.)	Kgf·cm	0.2	0.6	
Rated Current	A (rms)	0.9	1.5	2.7
Maximum Instant Current	A (rms)	2.5	4.2	7.8
Space in Shaft Direction (Max.)	mm	0.2		
Weight (When Brake is Attached)	Kg	0.6 0.9	1.1 1.9	1.6 2.4
Revolving Direction		U→V→W: CW		
Color		Black		
Oil Seal		Optional Specifications		

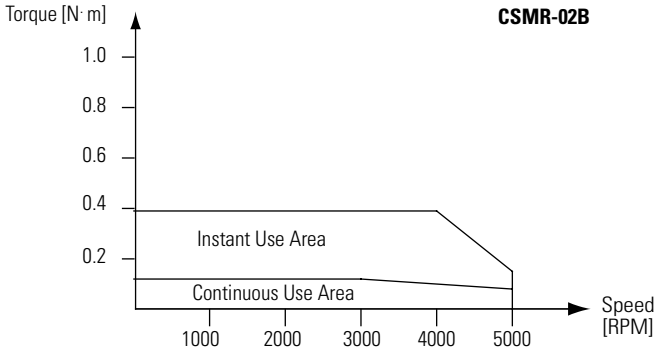
Brake Specifications

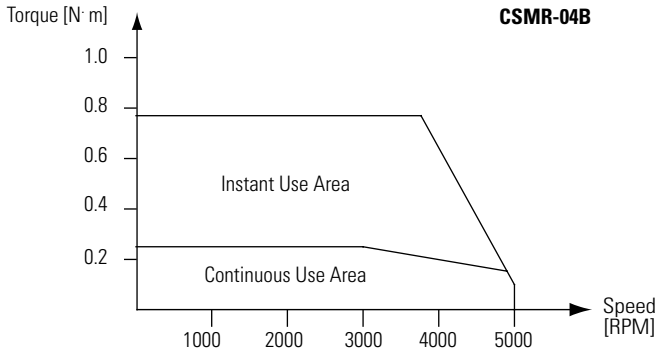
Table 3.18 CSMR Series Motor Brake Specifications

		CSMR-	
		01B	**02B, 04B**
Stiction Torque	N·m Kgf·cm	0.32 3.25	1.27 13
Brake Pull-in Time	ms	40 or less	80 or less
Brake Release Time	ms	20 or less	50 or less
Rated Voltage	VDC	24 ± 2.4	
Power Consumption	W	9	9.5

Speed Torque Curve







CSMS Series Motor

Common Specifications

Table 3.19 CSMS Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	49 m/s^2
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
When Brake is Attached	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Basic Specifications

Table 3.20 CSMS Series Motor Basic Specifications

		CSMS-								
		10B	**15B**	**20B**	**25B**	**30B**	**35B**	**40B**	**45B**	**50B**
Rated Voltage	V	220								
Rated Power	kW	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Rated Torque	Kgf·cm N·M	32.4 3.18	48.7 4.77	64.9 6.36	81 7.94	97.3 9.54	113 11.07	129 12.64	146 14.31	162 15.88
Maximum Instant Torque	Kgf·cm N·M	97 9.51	146 14.31	195 19.11	243 23.81	292 28.62	339 33.22	387 37.93	483 42.92	486 47.63
Rated Revolving Speed	RPM	300								
Maximum Revolving Speed	RPM	5000						4500		
Rotor Inertia	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	1.72 1.69	2.64 2.59	3.53 3.46	4.40 4.31	6.91 6.77	8.06 7.90	13.0 12.7	15.6 115.3	18.2 17.8
Rotor Inertia (When Brake is Attached)	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	1.92 1.88	2.90 2.84	3.89 3.81	4.84 4.74	7.60 7.45	8.88 8.69	14.4 14.1	17.3 17.0	20.1 19.7
Power Rate	kW/s	60	88	117	146	134	155	125	134	140
Mechanical Time Constant	ms	0.78	0.54	0.53	0.52	0.46	0.45	0.51	0.45	0.46
Electric Time Constant	ms	6.7	10	10.8	11	17	20			
Rated Current	A (rms)	7.2	9.4	13	15.9	18.6	21.6	24.7	28	28.5

Table 3.20 CSMS Series Motor Basic Specifications

Maximum Instant Current	A (rms)	30	40	560	68	80	92	105	118	120
Space in Shaft Direction (Max.)	mmX	0.3								
Weight (When Brake is Attached)	Kg	4.5 5.1	5.1 6.5	6.5 7.9	7.5 8.9	9.3 11.0	10.9 12.6	12.9 14.8	15.1 17.0	17.3 19.2
Revolving Direction		U→V→W: CW								
Color		Black								
Oil Seal		Embedded								

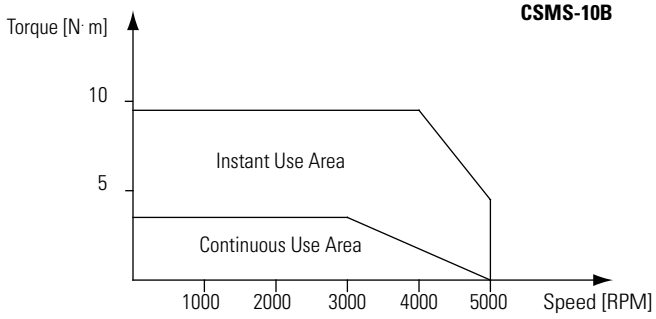
Brake Specifications

Table 3.21 CSMS Motor Brake Specifications

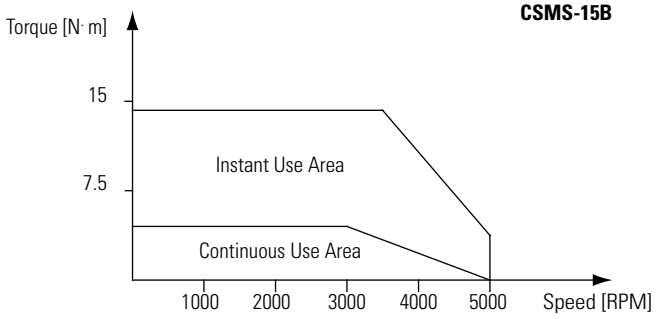
		CSMS-			
		10B	**15B, 25B**	**30B, 35B**	**40B, 50B**
Stiction Torque	N·m Kgf·cm	4.9 or more 50	7.8 or more 80	11.8 or more 120	16.1 or more 165
Rotor Inertia	$Kg \cdot m^2 \cdot 10^{-4}$ $Kg \cdot cm \cdot s^2$	0.25 0.26	0.33 0.33	1.35 1.38	
Brake Pull-in Time	ms	50 or less		80 or less	110 or less
Brake Release Time	ms	15 or less			50 or less
Release Voltage	VDC	2 or more			
Rated Voltage	VDC	24 ± 2.4			
Rated Current	A	0.74 ± 10%	0.81 ± 10%		0.90 ± 10%
Allowed Brake Energy: once	J Kgf·m	392 40			1470 150
Overall Allowed Brake Energy	J Kgf·m	2.0×10^5 2×10^4	4.9×10^5 5×10^4	4.9×10^6 5×10^5	2×10^6 2.2×10^5

Speed Torque Curve

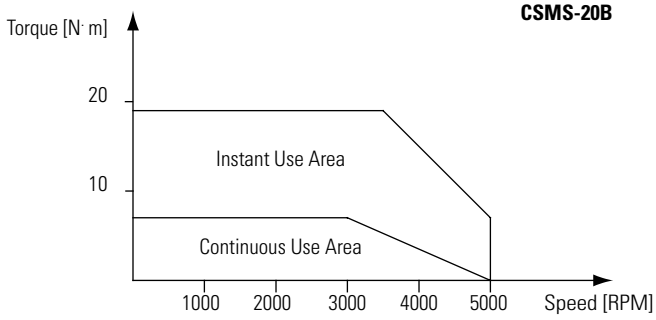
CSMS-10B



CSMS-15B



CSMS-20B



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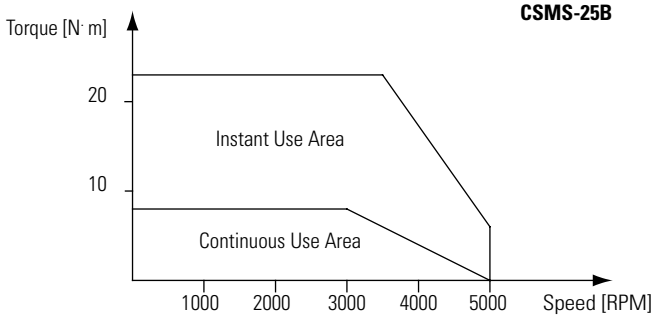
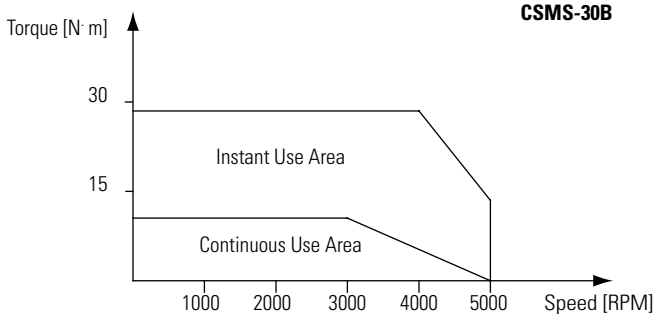


CSMS-30B



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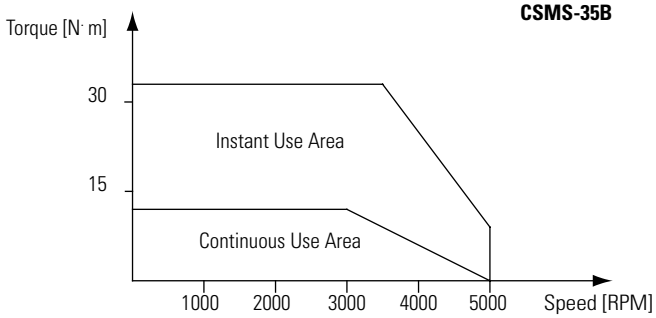
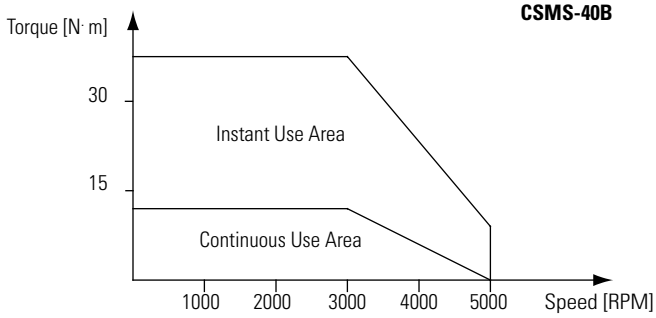


CSMS-40B



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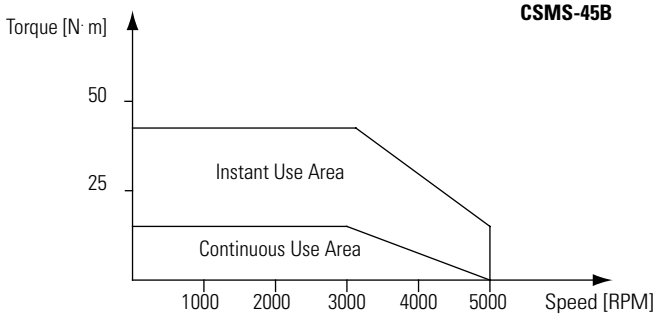
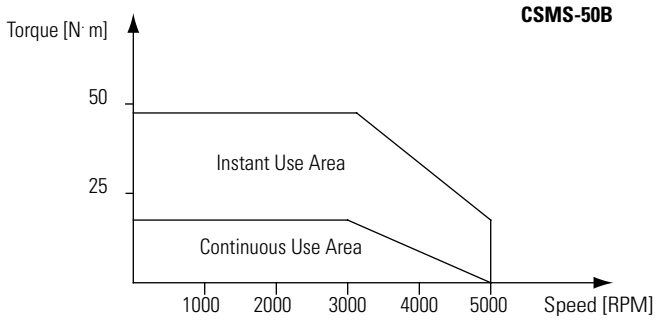



CSMS-50B
Torque [N· m]
50
25
Instant Use Area
Continuous Use Area
1000
2000
3000
4000
5000
Speed [RPM]

CSMT Series Motor

Common Specifications

Table 3.22 CSMT Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-10 to +80℃
Insulation Resistance	500VDC 100 MΩ
Number of Poles	8 Poles
Insulation Grade	F Grade
Dielectric Strength	1500 V_{AC} 60 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	20 to 85% (Non-condensing)

Basic Specifications

Table 3.23 CSMT Series Motor Basic Specifications

		CSMT-							
		A3B	A5B	01B	02B	04B	06B	08B	10B
Rated Voltage	V	220							
Rated Power	W	30	50	100	200	400	600	750	950
Rated Torque	Kgf·cm N·m	0.97 0.095	1.62 0.159	3.25 0.318	6.5 0.64	13.0 1.27	19.5 1.91	24.4 2.39	30.9 3.0
Maximum Instant Torque	Kgf·cm N·m	2.9 0.29	4.9 0.48	9.7 0.95	19.5 1.91	39 3.82	58.5 5.73	73 7.16	92.6 9.1
Rated Revolving Speed	RPM	3000							
Maximum Revolving Speed	RPM	5000							
Rotor Inertia	$gf \cdot cm \cdot s^2$ $Kg \cdot m^2 \cdot 10^{-4}$	0.01 0.01	0.02 0.02	0.03 0.03	0.18 0.18	0.34 0.34	1.00 0.98	1.10 1.08	1.56 1.53
Rotor Inertia (When Brake is Attached)	$gf \cdot cm \cdot s^2$ $Kg \cdot m^2 \cdot 10^{-4}$	0.04 0.04	0.05 0.05	0.06 0.06	0.28 0.28	0.44 0.44	1.24 1.22	1.34 1.32	1.66 1.63
Power Rate	kW/s	9.2	12.9	34.5	23.0	48.7	37.3	51.3	56.4
Mechanical Time Constant	ms	1.1	0.9	0.6	0.9	0.7	0.6	0.6	0.6
Electric Time Constant	ms	0.8	1.1	1.6	3.2	3.5	6.0	4.8	5.6
Shaft Stiction Torque (Max.)	Kgf·cm	0.2			0.4		0.8		1.5
Rated Current	A (rms)	0.3	0.6	1.1	1.7	3.3	4.4	5.0	5.4
Maximum Instant Current	A (rms)	0.9	1.5	3.0	4.9	3.2	9.6	14.1	15.3
Space in Shaft Direction (Max.)	mm	0.2							

Table 3.23 CSMT Series Motor Basic Specifications

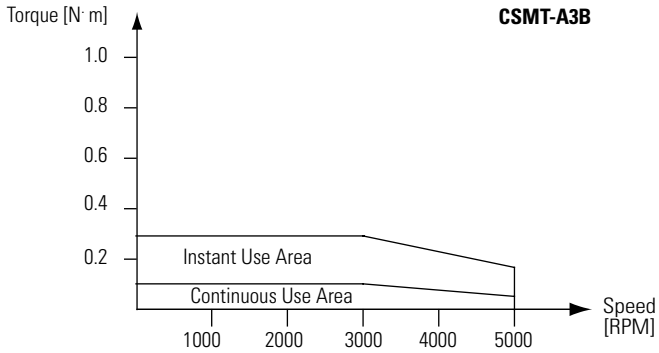
Weight (When Brake is Attached)	Kg	0.3 0.5	0.4 0.6	0.5 0.7	0.9 1.4	1.3 1.8	2.2 3.1	2.5 3.4	3.7 4.5
Revolving Direction		U→V→W: CCW							
Color		Black							Silver White
Oil Seal		Optional Specifications							

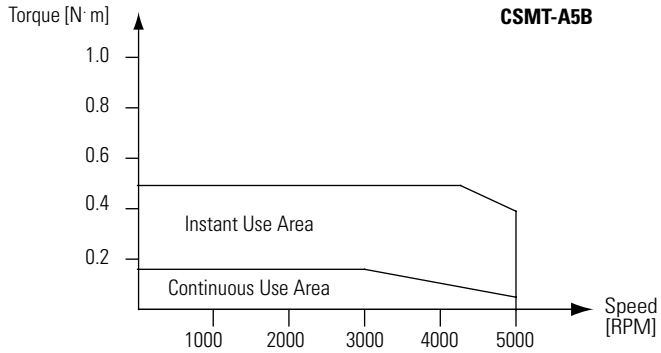
Brake Specifications

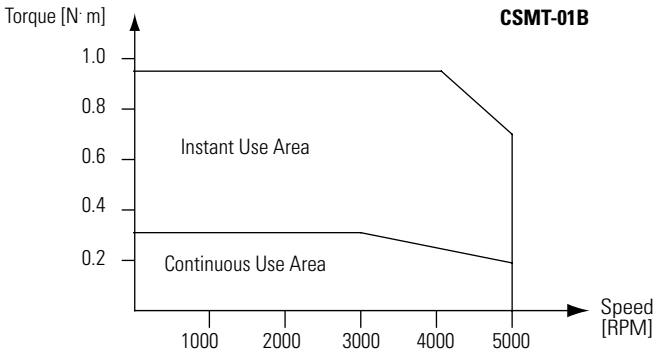
Table 3.24 CSMT Series Motor Brake Specifications

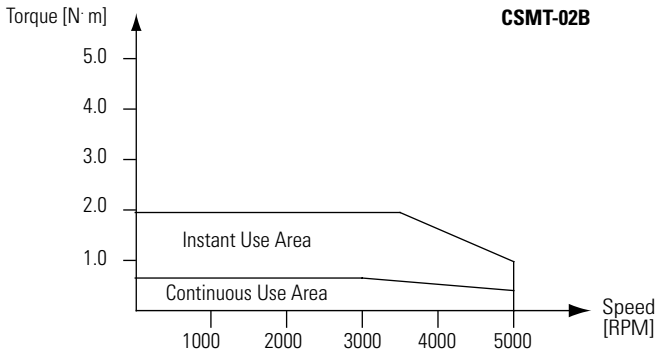
		CSMT-								
		A3B	**A5B**	**01B**	**02B**	**04B**	**06B**	**08B**	**10B**	**15B**
Stiction Torque	N·m Kgf·cm	0.32 3.25			1.27 13		2.55 26			9.3 94
Brake Pull-in Time	ms	40			50		80			20
Brake Release Time	ms	20					50			90
Rated Voltage	VDC	24±2.4								
Power Consumption	W	5			9		9.5			17.9

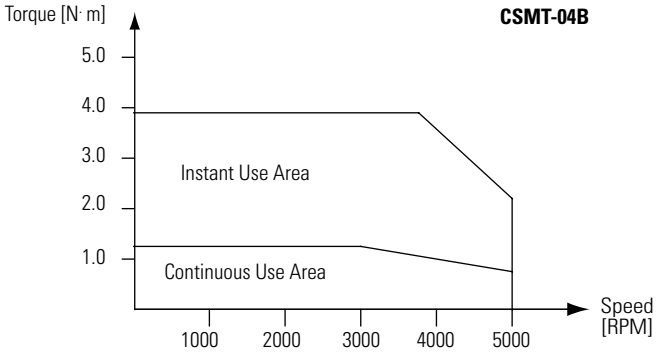
Speed Torque Curve

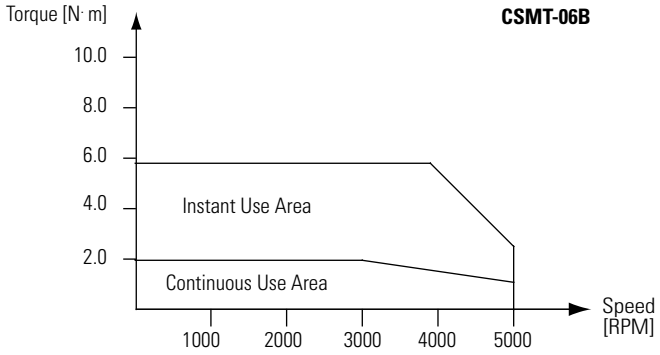


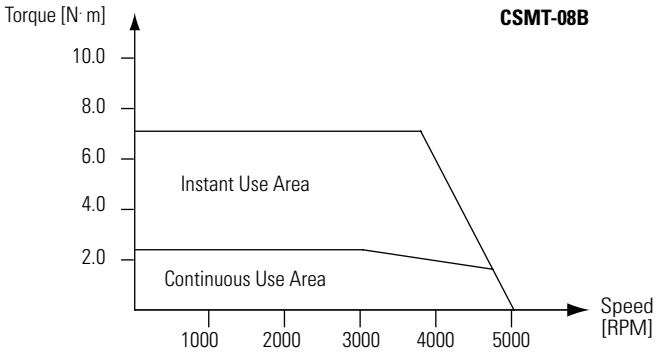


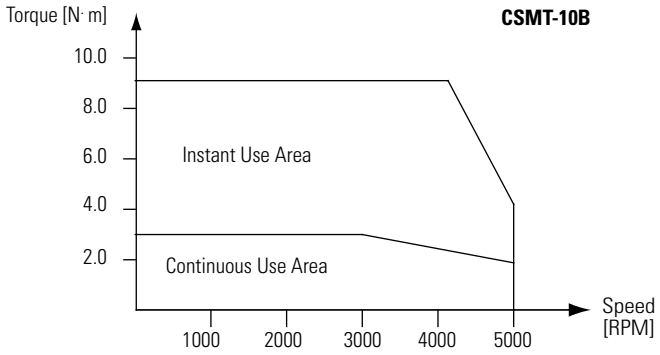

Torque [N· m]
CSMT-01B
1.0
0.8
0.6
0.4
0.2
Instant Use Area
Continuous Use Area
Speed [RPM]
1000
2000
3000
4000
5000


Torque [N· m]
CSMT-02B
5.0
4.0
3.0
2.0
1.0
Instant Use Area
Continuous Use Area
Speed [RPM]
1000
2000
3000
4000
5000


Torque [N· m]
CSMT-04B
5.0
4.0
3.0
2.0
1.0
Instant Use Area
Continuous Use Area
Speed [RPM]
1000
2000
3000
4000
5000


Torque [N· m]
CSMT-06B
10.0
8.0
6.0
4.0
2.0
Instant Use Area
Continuous Use Area
Speed [RPM]
1000
2000
3000
4000
5000


Torque [N· m]
CSMT-08B
10.0
8.0
6.0
4.0
2.0
Instant Use Area
Continuous Use Area
Speed [RPM]
1000
2000
3000
4000
5000


Torque [N· m]
CSMT-10B
10.0
8.0
6.0
4.0
2.0
Instant Use Area
Continuous Use Area
Speed [RPM]
1000
2000
3000
4000
5000

CSMZ Series Motor

Common Specifications

Table 3.25 CSMZ Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	49 m/s^2
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
When Brake is Attached	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Basic Specifications

Table 3.26 CSMZ Series Motor Basic Specification

		CSMZ-					
		A3D	A5D	01B	02B	04B	08B
Rated Voltage	V	110/220		220			
Rated Power	W	30	50	100	200	400	750
Rated Torque	Kgf·cm N·m	0.97 0.095	1.62 0.159	3.24 0.318	6.5 0.637	13 1.274	24.3 2.38
Maximum Instant Torque	Kgf·cm N·m	2.9 0.284	4.9 0.48	9.7 0.95	19.5 1.911	39 3.822	73 7.154
Rated Revolving Speed	RPM	3000					
Maximum Revolving Speed	RPM	5000					4500
Rotor Inertia	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	0.016 0.016	0.026 0.025	0.063 0.062	0.17 0.17	0.37 0.36	1.34 1.31
Rotor Inertia (When Brake is Attached)	$gf{\cdot}cm{\cdot}s^2$ $Kg{\cdot}m^2{\cdot}10^{-4}$	0.020 0.020	0.031 0.030	0.067 0.066	0.20 0.20	0.40 0.39	1.42 1.39
Power Rate	kW/s	5.8	9.9	16.3	24.4	44.8	43.2
Mechanical Time Constant	ms	1.8	1.2	0.77	0.63	0.54	0.45
Electric Time Constant	ms	0.6	0.67	0.88	3.4	3.5	7.4
Rated Current	A (rms)	1.0	1.0	1.0	1.6	2.5	4.3

Table 3.26 CSMZ Series Motor Basic Specification

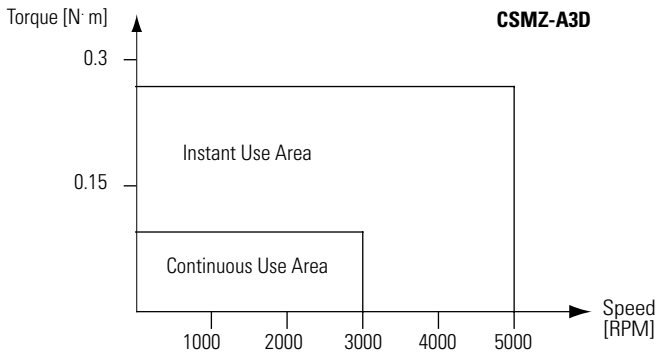
Maximum Instant Current	A (rms)	4.3	4.3	4.3	6.9	10.5	18.3
Space in Shaft Direction (Max.)	mm	0.3					
Weight	Kg	0.27	0.34	0.56	1.0	1.6	3.2
Revolving Direction		U→V→W: CW					
Color		Black					
Oil Seal		Optional Specifications					

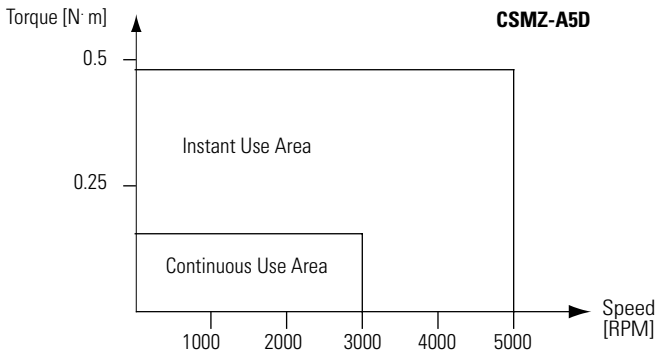
Brake Specifications

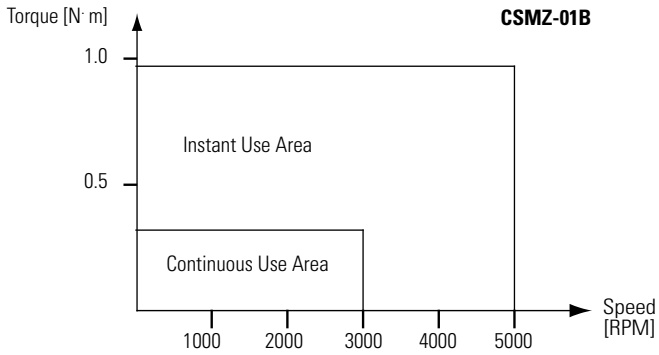
Table 3.27 CSMZ Series Motor Brake Specifications

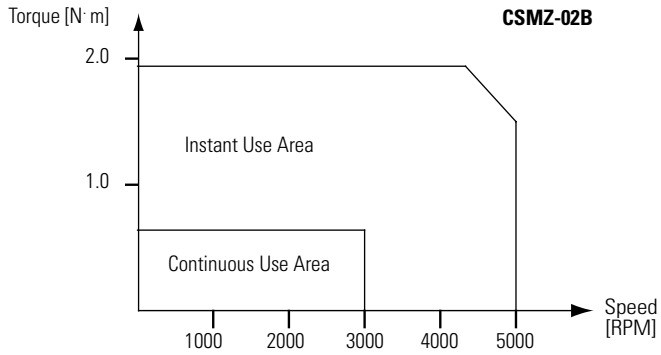
		CSMZ-					
		A3D	**A5D**	**01B**	**02B**	**04B**	**08B**
Stiction Torque	N·m Kgf·cm	0.29 or more 3			1.27 or more 13		2.45 or more 25
Rotor Inertia	$Kg \cdot m^2 \cdot 10^{-4}$ $gf \cdot cm \cdot s^2$	0.003			0.03		0.09
Brake Pull-in Time	ms	25 or less			50 or less		60 or less
Brake Release Time	ms	20 or less			15 or less		15 or less
Release Voltage	VDC	1 or more					
Rated Voltage	VDC	24 ± 2.4					
Rated Current	A	0.26			0.36		0.43
Allowed Brake Energy	J Kgf·m	39.2 4			137 14		196 20
Overall Allowed Brake Energy	J Kgf·m	4.9×10^3 500			44.1×10^3 4500		147×10^3 15000

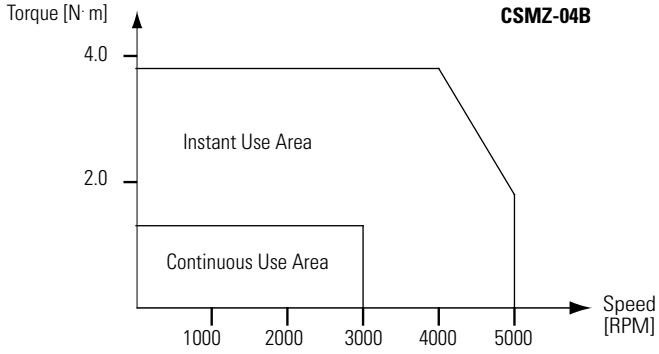
Speed Torque Curve

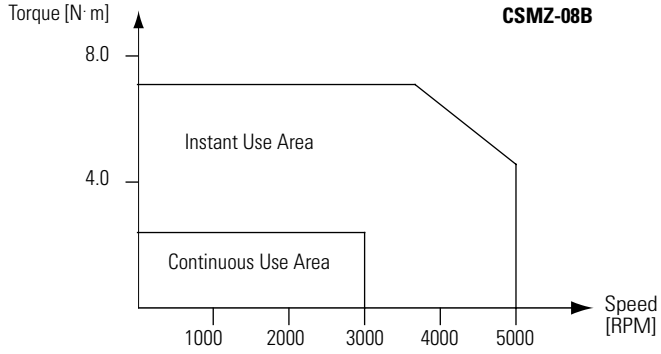





Torque [N· m]
CSMZ-01B
1.0
0.5
Instant Use Area
Continuous Use Area
1000
2000
3000
4000
5000
Speed
[RPM]


Torque [N· m]
CSMZ-02B
2.0
1.0
Instant Use Area
Continuous Use Area
1000
2000
3000
4000
5000
Speed
[RPM]


Torque [N· m]
CSMZ-04B
4.0
2.0
Instant Use Area
Continuous Use Area
1000
2000
3000
4000
5000
Speed
[RPM]


Torque [N· m]
CSMZ-08B
8.0
4.0
Instant Use Area
Continuous Use Area
1000
2000
3000
4000
5000
Speed
[RPM]

RSMD Series Motor

Common Specifications

Table 3.28 RSMD Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	5 g (49 $m/s^{2)}$, 10 to 50 Hz. 10 g (98 $m/s^{2)}$, 30- minute Continuous Operation
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Brake Specifications

Table 3.29 RSMD Series Motor Brake Specifications

Item	Unit	Applied Motors		
		RSMD-08B	RSMD-10B RSMD-15B RSMD-20B RSMD-25B RSMD-30B	RSMD-35B RSMD-40B RSMD-45B RSMD-50B
Stiction Torque	N·m	12	16.5	25
Rotor Inertia	x 10^{-4} $Kg·m^2$	0.45	1.2	4.7
Armature Absorption Time	ms	100	110	160
Armature Release Time	ms	20	50	75
Release Voltage	DC, V	2 (at 20℃)	2 (at 20℃)	2 (at 20℃)
Excited Voltage	DC, V	24 ± 2.4	24 ± 2.4	24 ± 2.4
Excited Current (cool down)	DC, A	0.83	0.876	1.287

- Figures above (except stiction torque, release voltage and excited voltage) are representative characteristics.
- Brake backlash is 1.5 degrees or less.

• Separate power is needed for brake. (No polarity assigned)

Basic Specifications

Table 3.30 RSMD Series Motor Basic Specification

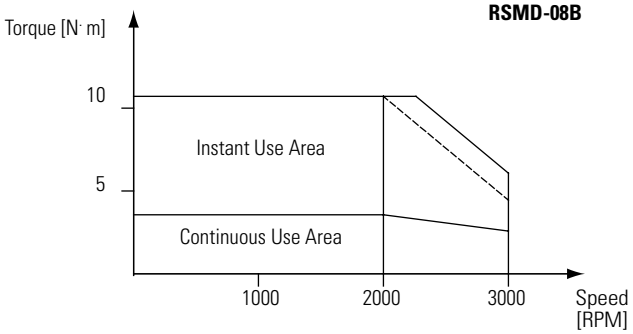
Item	**Unit**	**RSMD-**									
		08B	**10B**	**15B**	**20B**	**25B**	**30B**	**35B**	**40B**	**45B**	**50B**
Flange Size	mm	120	130	130	130	130	130	180	180	180	180
Rated Output	kW	0.75	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Rated	%	100									
Rated Revolving Speed	r/min	2000									
Maximum Revolving Speed	r/min	3000									
Rated Torque	N·m	3.58	4.77	7.15	9.55	11.9	14.3	16.7	19.1	21.5	23.9
	kgf·cm	36.5	48.6	72.9	97.4	121	146	170.4	195	219	244
Instant Maximum Torque	N·m	10.85	14.4	21.5	28.5	35.5	42.9	50.0	56.4	64.3	71.4
	kgf·cm	110.7	147	219.2	292	363	437	510.2	576	657	729
Rated Current	$A_{(rms)}$	5.0	5.8	9.4	12.3	14	17.8	19.6	23.4	26.2	28.0
Rotator Inertia	x 10^{-4} Kg·m^2	2.67	4.82	7.0	9.3	11.5	13.8	31.49	33.5	37.7	45.5
	gf·cm·$sec.^2$	2.72	4.92	7.1	9.5	11.7	14.1	32.13	34.2	38.5	46.4
Rotator Inertia (Brake)	x 10^{-4} Kg·m^2	3.12	6.1	8.3	10.5	12.8	15.0	36.19	38.7	42.9	50.7
	gf·cm·sec^2	3.18	6.2	8.5	10.7	13.1	15.3	36.93	39.5	43.8	51.7
Electric Time Constant	ms	15.76	18	22	21	21	20	28.27	28.0	30	32
Mechanical Time Constant	ms	0.56	0.62	0.59	0.53	0.50	0.48	0.84	0.83	0.8	0.74
	ms (Brake)	0.65	0.78	0.697	0.60	0.56	0.52	0.97	0.96	0.9	0.83
Power Rate	kW/s	49.1	48.8	74.6	100.0	124.9	151.2	90.66	111	124.8	128.3
	kW/s (Brake)	41.94	38.6	62.9	88.6	112.2	139.4	78.9	96	109.6	115.2
Instant Maximum Current	A (o-p)	21.2	24	40	52	60	76	79.3	100	111	120
Insulation Grade	-	F									
Vibration Grade	-	V-15									
Paint Color	-	Black									
Mass	kg	4.8	6.8	8.5	10.6	12.8	14.6	16.2	19.75	21.5	25.0
	kg (Brake)	6.1	8.7	10.1	12.5	14.7	16.5	18.7	23.25	25	28.5
Operation Power Voltage	V_{AC}	200/220									

• Characteristics above are representative figures of two-phase sine wave operation.

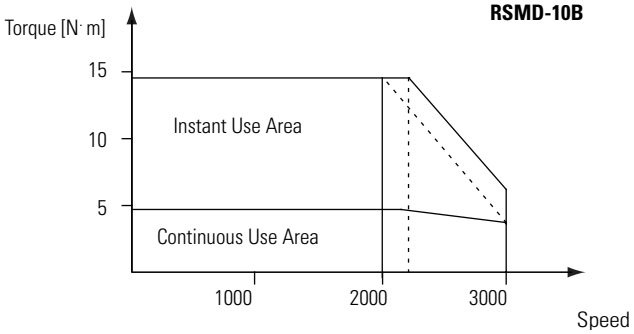
- Corresponding to IP65 (When an outgoing line is in down direction, connector part is not included.)
- Measure at 40℃ ambient with temperature at 65℃ or less at the center of motor frame.

Speed Torque Curve

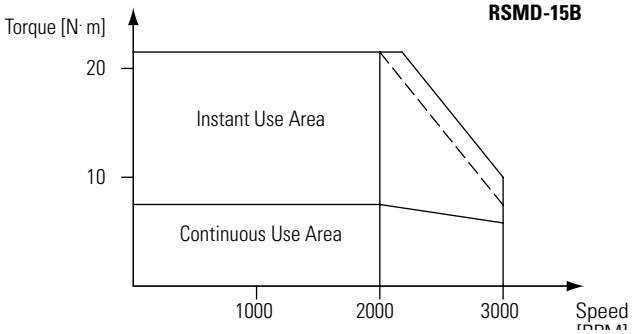
RSMD-08B



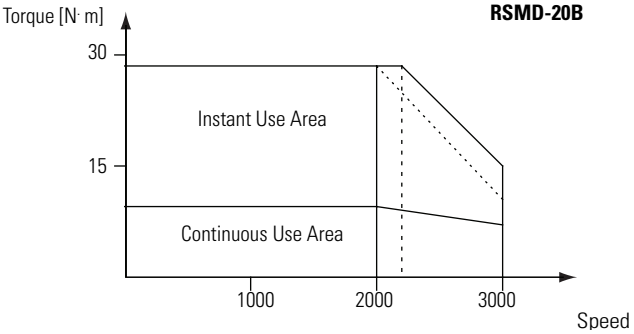
RSMD-10B



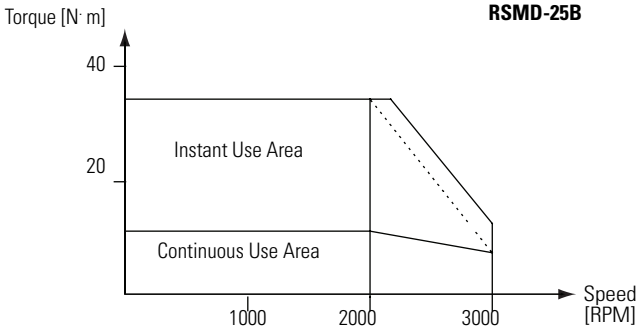
RSMD-15B



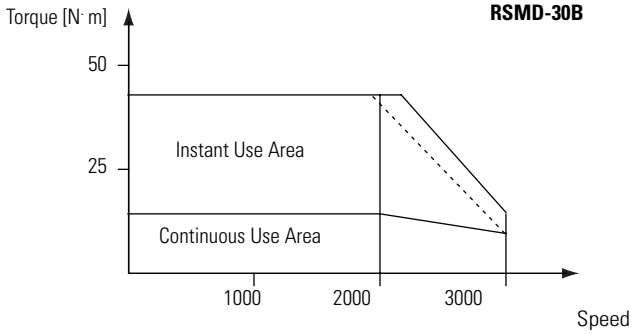
RSMD-20B

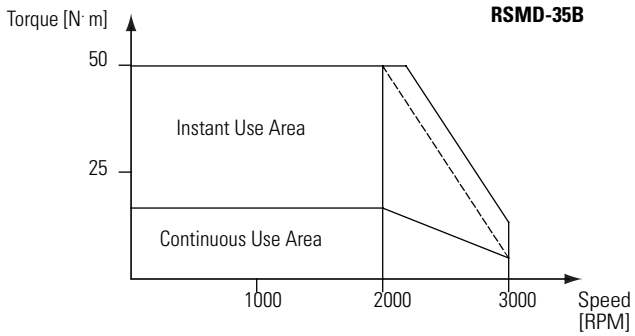


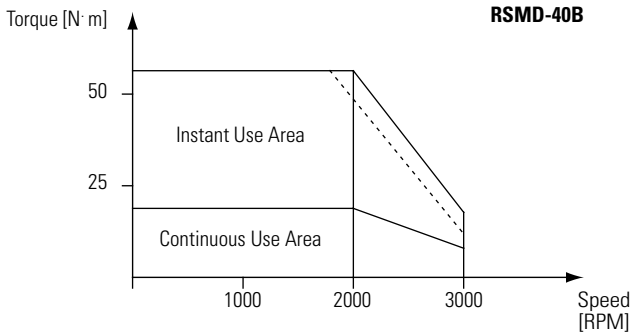
RSMD-25B

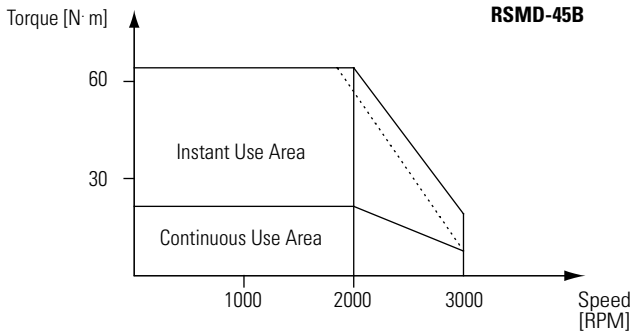


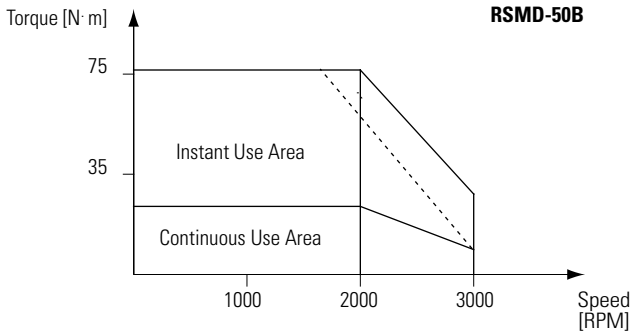
RSMD-30B




RSMD-35B
Torque [N· m]
50
25
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed
[RPM]


RSMD-40B
Torque [N· m]
50
25
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed
[RPM]


RSMD-45B
Torque [N· m]
60
30
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed
[RPM]


RSMD-50B
Torque [N· m]
75
35
Instant Use Area
Continuous Use Area
1000
2000
3000
Speed
[RPM]

RSMF Series Motor

Common Specifications

Table 3.31 RSMF Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	5 g (49 $m/s^{2)}$, 10 to 50 Hz. 10 g (98 $m/s^{2)}$, 30- minute Continuous Operation
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Brake Specifications

Table 3.32 RSMF Series Motor Brake Specifications

Item	Unit	Applied Motors		
		RSMF-04B	RSMF-08B RSMF-15B	RSMF-25B RSMF-35B RSMF-45B
Stiction Torque	N·m	16.5	25	45
Rotor Inertia	x 10^{-4} Kg·m^2	1.2	4.7	11
Armature Absorption Time	ms	110	160	220
Armature Release Time	ms	50	75	100
Release Voltage	DC, V	2 (at 20℃)	2 (at 20℃)	2 (at 20℃)
Excited Voltage	DC, V	24 ± 2.4	24 ± 2.4	24 ± 2.4
Excited Current (cool down)	DC, A	0.876	1.287	0.797

- Figures above (except stiction torque, release voltage and excited voltage) are representative characteristics.
- Brake backlash is 1.5 degrees or less.
- Separate power is needed for brake. (No polarity assigned)

Basic Specifications

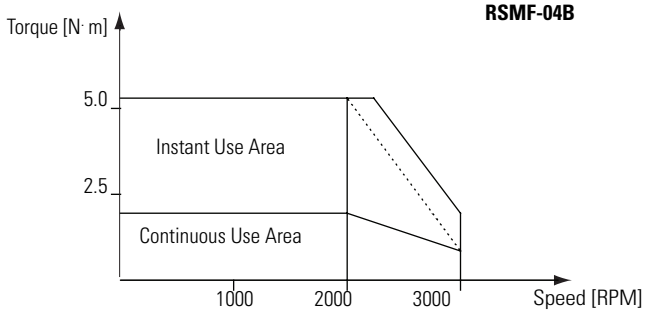
Table 3.33 RSMF Series Motor Basic Specification

Item	Unit	RSMF-					
		04B	08B	15B	25B	35B	45B
Flange Size	mm	130	180	180	220	220	220
Rated Output	kW	0.4	0.75	1.5	2.5	3.5	4.5
Rated	%	100					
Rated Revolving Speed	r/min	2000					
Maximum Revolving Speed	r/min	3000					
Rated Torque	N·m	1.91	3.58	7.16	11.9	16.7	21.5
	kgf·cm	19.5	36.5	73.0	121	170	219
Instant Maximum Torque	N·m	5.3	10.7	21.5	30.4	44.1	54.9
	kgf·cm	54	109	219	310	450	560
Rated Current	$A_{(rms)}$	2.8	5.0	9.5	13.4	20.0	23.5
Rotator Inertia	x 10^{-4} Kg·m^2	2.13	9.6	18.0	33.7	42.6	58.7
	gf·cm·$sec.^2$	2.17	9.8	18.4	34.4	43.5	59.9
Rotator Inertia (Brake)	x 10^{-4} Kg·m^2	3.42	14.8	23.2	45.3	54.3	70.3
	gf·cm·$sec.^2$	3.49	15.1	23.7	46.2	55.4	71.7
Electric Time Constant	ms	14	21	25	35	41	41
Mechanical Time Constant	ms	1.1	2.1	1.4	1.2	1.0	0.8
	ms(Brake)	1.8	3.2	1.8	1.6	1.3	1.0
Power Rate	kW/s	17.5	13.6	29.0	42.6	66.5	80.1
	kW/s (Brake)	10.9	8.8	22.5	31.7	52.2	66.9
Instant Maximum Current	A (o-p)	11.9	21.2	40.3	56.9	84	99.7
Insulation Grade	-	F					
Vibration Grade	-	V-15					
Paint Color	-	Black					
Mass	kg	4.7	8.6	11.0	14.8	15.5	19.9
	kg (Brake)	6.7	10.6	14.0	17.5	19.2	24.3
Operation Power Voltage	V_{AC}	200/220					

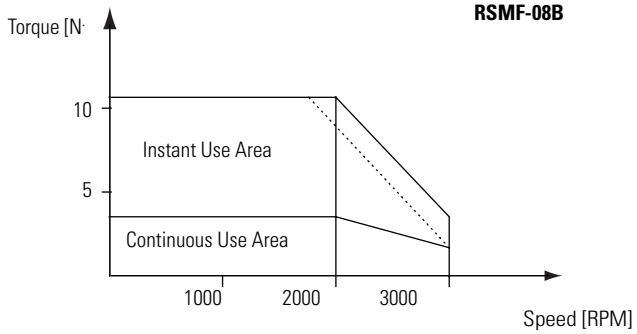
- Characteristics above are representative figures of two-phase sine wave operation.
- Corresponding to IP65 (When outgoing line is in down direction, connector part is not included.)
- Measure at 40℃ ambient with temperature at 65℃ or less at the center of motor frame.

Speed Torque Curve

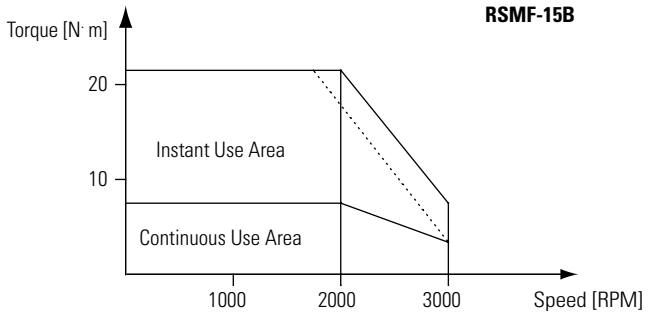
RSMF-04B



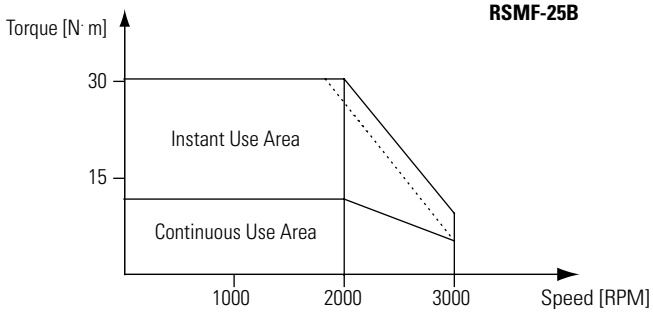
RSMF-08B



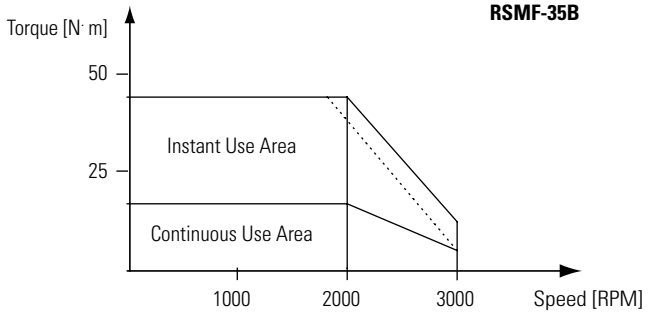
RSMF-15B



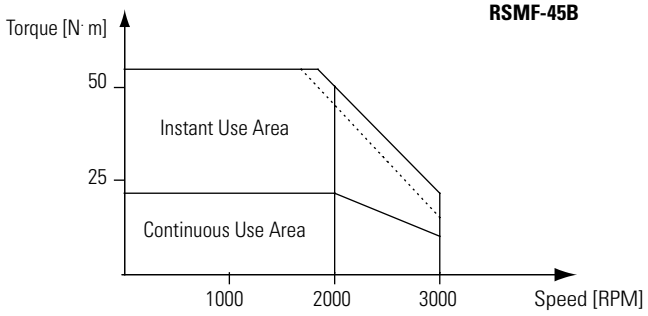
RSMF-25B



RSMF-35B



RSMF-45B



RSMH Series Motor

Common Specifications

Table 3.34 RSMH Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	5 g (49 $m/s^{2)}$, 10 to 50 Hz. 10 g (98 $m/s^{2)}$, 30- minute Continuous Operation
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Brake Specifications

Table 3.35 RSMH Series Motor Brake Specifications

Item	Unit	Applied Motors	
		RSMH-05B RSMH-10B RSMH-15B	**RSMH-20B RSMH-30B RSMH-40B RSMH-50B**
Stiction Torque	N·m	16.5	25
Rotor Inertia	x 10^{-4} Kg·m^2	1.2	4.7
Armature Absorption Time	ms	110	160
Armature Release Time	ms	50	75
Release Voltage	DC, V	2 (at 20℃)	2 (at 20℃)
Excited Voltage	DC, V	24± 2.4	24 ± 2.4
Excited Current (cool down)	DC, A	0.876	1.287

- Figures above (except stiction torque, release voltage and excited voltage) are representative characteristics.
- Brake backlash is 1.5° degrees or less.
- Separate power is needed for brake. (No polarity assigned)

Basic Specifications

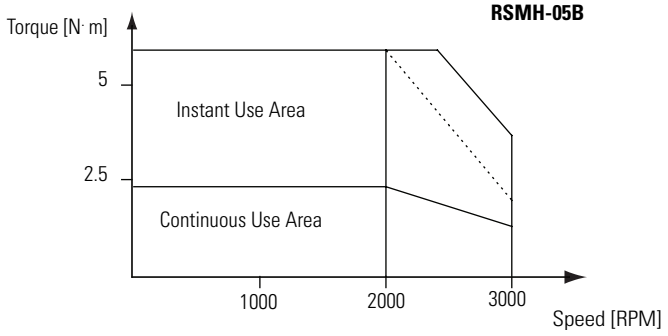
Table 3.36 RSMH Series Motor Basic Specifications

Item	Unit	RSMH-						
		05B	**10B**	**15B**	**20B**	**30B**	**40B**	**50B**
Flange Size	mm	130	130	130	180	180	180	180
Rated Output	kW	0.5	1.0	1.5	2.0	3.0	4.0	5.0
Rated	%	100						
Rated Revolving Speed	r/min	2000						
Maximum Revolving Speed	r/min	3000						
Rated Torque	N·m	2.39	4.77	7.15	9.55	14.32	19.1	23.87
	kgf·cm	24.4	48.6	72.9	97.4	146	195	243
Instant Maximum Torque	N·m	6.0	14.4	21.5	28.5	42.9	56.4	71.4
	kgf·cm	61	147	219.2	291	437	576	729
Rated Current	$A_{(rms)}$	3.2	5.6	9.4	12.3	17.8	23.4	28.0
Rotator Inertia	x 10^{-4} Kg·m^2	14.0	26.0	42.9	62.0	94.1	120.0	170.0
	gf·cm·$sec.^2$	14.3	26.5	43.8	63.3	96	122.4	173.5
Rotator Inertia (Brake)	x 10^{-4} Kg·m^2	15.2	27.2	44.1	67.9	100.0	126.0	176.0
	gf·cm·$sec.^2$	15.5	27.80	45	69.3	102	128.60	179.6
Electric Time Constant	ms	17	18	22	26	26	30	31
Mechanical Time Constant	ms	4.8	3.4	3.5	2.5	2.9	2.6	2.6
	ms (Brake)	5.2	3.6	3.6	2.7	3.1	2.7	2.7
Power Rate	kW/s	4.1	8.9	12.2	15.0	22.2	31.1	34.1
	kW/s (Brake)	3.8	8.5	11.8	13.7	20.9	29.6	32.9
Instant Maximum Current	A (o-p)	11.5	23.8	40	51.9	75.8	100	120
Insulation Grade	-	F						
Vibration Grade	-	V-15						
Paint Color	-	Black						
Mass	kg	5.3	8.5	10	16	18.2	22	26.7
	kg (Brake)	6.9	9.5	11.6	19.5	21.7	25.5	30.2
Operation Power Voltage	V_{AC}	200/220						

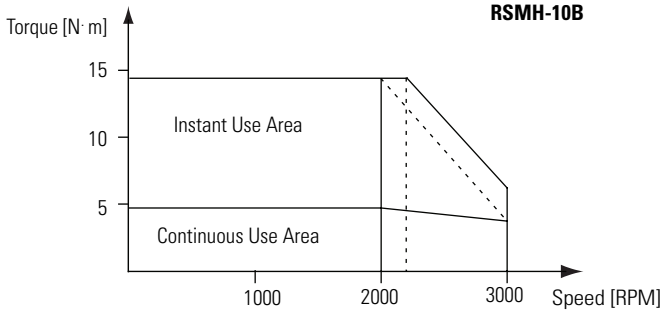
- Characteristics above are representative figures of two-phase sine wave operation.
- Corresponding to IP65 (When outgoing line is in down direction, connector part is not included.)
- Measure at 40℃ ambient with temperature at 65℃ or less at the center of motor frame.

Speed Torque Curve

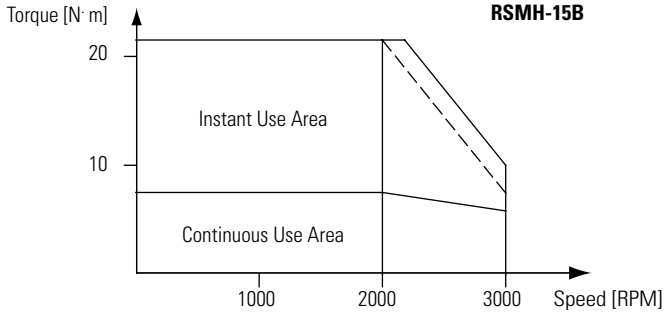
RSMH-05B



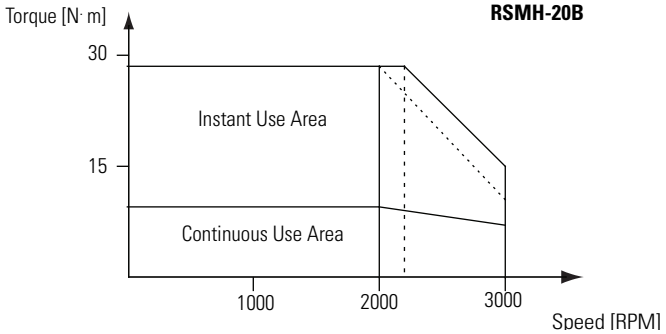
RSMH-10B



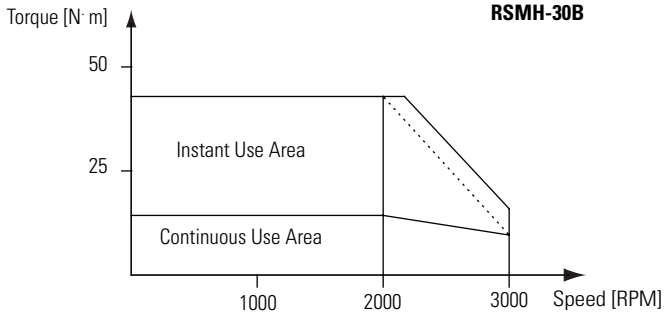
RSMH-15B



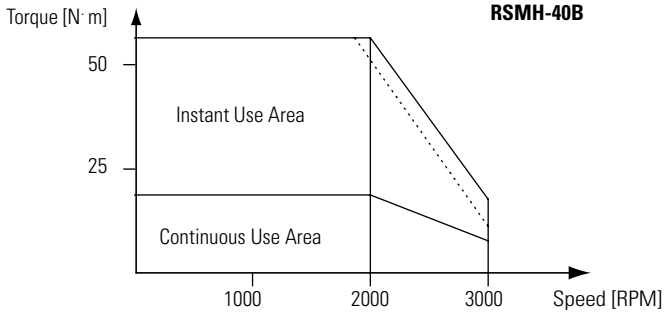
RSMH-20B



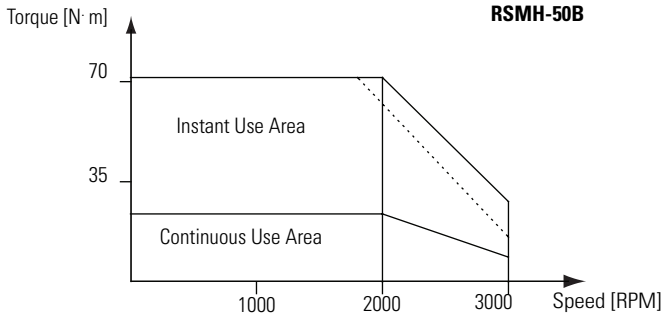
RSMH-30B



RSMH-40B



RSMH-50B



RSMK Series Motor

Common Specifications

Table 3.37 RSMK Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	5 g (49 $m/s^{2)}$, 10 to 50 Hz. 10 g (98 $m/s^{2)}$, 30- minute Continuous Operation
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Brake Specifications

Table 3.38 RSMK Series Motor Brake Specifications

Item	Unit	Applied Motors	
		RSMK-03B RSMK-06B RSMK-09B	RSMK-12B RSMK-20B RSMK-30B RSMK-45B RSMK-60B
Stiction Torque	N·m	16.5	25
Rotor Inertia	x 10^{-4} $Kg·m^2$	1.2	4.7
Armature Absorption Time	ms	110	160
Armature Release Time	ms	50	75
Release Voltage	DC, V	2 (at 20℃)	2 (at 20℃)
Excited Voltage	DC, V	24 ± 2.4	24 ± 2.4
Excited Current (cool down)	DC, A	0.876	1.287

- Figures above (except stiction torque, release voltage and excited voltage) are representative characteristics.
- Brake backlash is 1.5 degrees or less.
- Separate power is needed for brake. (No polarity assigned)

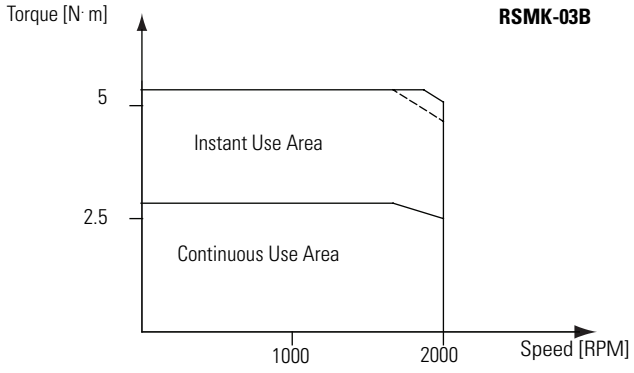
Basic Specifications

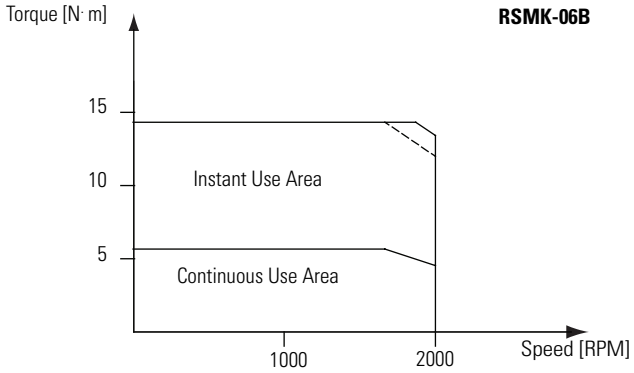
Table 3.39 RSMK Series Motor Basic Specifications

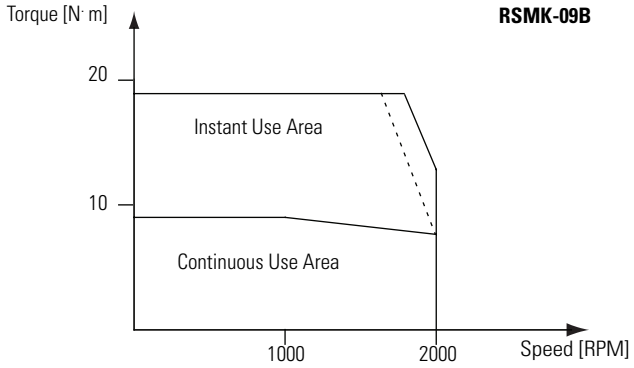
Item	Unit	RSMK-							
		03B	**06B**	**09B**	**12B**	**20B**	**30B**	**45B**	**60B**
Flange Size	mm	130	130	130	180	180	180	180	180
Rated Output	kW	0.3	0.6	0.9	1.2	2.0	3.0	4.5	6.0
Rated	%	100							
Rated Revolving Speed	r/min	1000							
Maximum Revolving Speed	r/min	2000							
Rated Torque	N·m	2.84	5.7	8.62	11.5	19.1	28.4	42.9	57.2
	kgf·cm	29	58.2	88	117	198	290	437	583
Instant Maximum Torque	N·m	6.3	14.4	19.3	28	44	63.7	107	129
	kgf·cm	64.3	146.9	197	286	449	650	1091	1315
Rated Current	$A_{(rms)}$	3.5	6.2	7.6	11.6	18.5	24.0	33.0	47.0
Rotator Inertia	x 10^{-4} Kg·m^2	2.64	4.9	7.0	30.4	35.5	55.7	80.9	99
	gf·cm·sec^2	2.7	5.0	7.1	31.0	36.2	56.8	82.6	101
Rotator Inertia (Brake)	x 10^{-4} Kg·m^2	3.84	6.2	8.3	36.2	41.4	61.7	86.9	108
	gf·cm·$sec.^2$	3.92	6.3	8.5	36.9	42.2	63.0	88.7	110
Electric Time Constant	ms	12.7	21	24	31	31	34.48	42	45
Mechanical Time Constant	ms	1.25	0.65	0.53	0.94	0.85	0.78	0.71	0.63
	ms (Brake)	1.81	0.82	0.63	1.12	1.0	0.86	0.77	0.68
Power Rate	kW/s	31.2	67	108	44	104	148	232	337
	kW/s (Brake)	21.4	53	91	37	89	133	216	309
Instant Maximum Current	A (o-p)	11	22	24	40.0	60	80.0	118	155
Insulation Grade	-	F							
Vibration Grade	-	V-15							
Paint Color	-	Black							
Mass	kg	4.8	6.2	8.6	15.5	17.5	25	34	41
	kg (Brake)	6.3	8	10.1	19.0	21.0	29	39.5	47
Operation Power Voltage	V_{AC}	200/220							

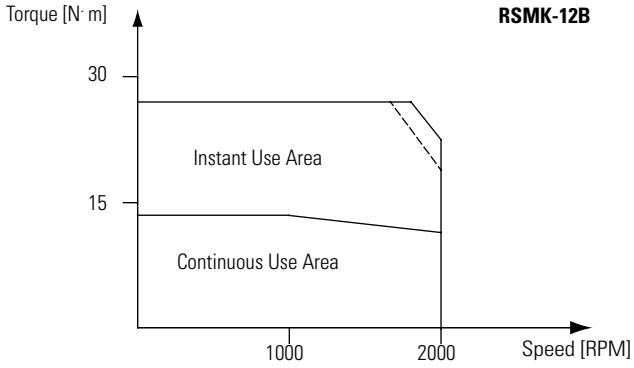
- Characteristics above are representative figures of two-phase sine wave operation.
- Corresponding to IP65 (When outgoing line is in down direction, connector part is not included.)
- Measure at 40℃ ambient with temperature at 65℃ or less at the center of motor frame.

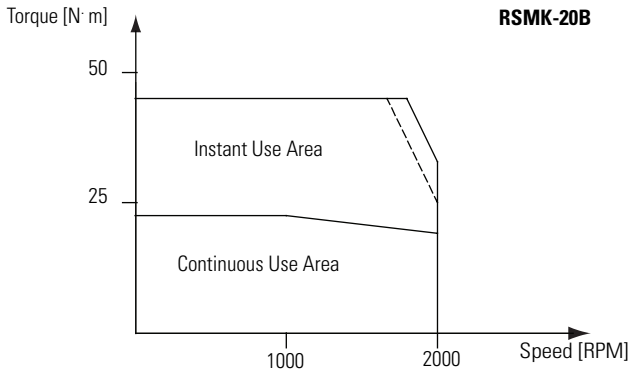
Speed Torque Curve

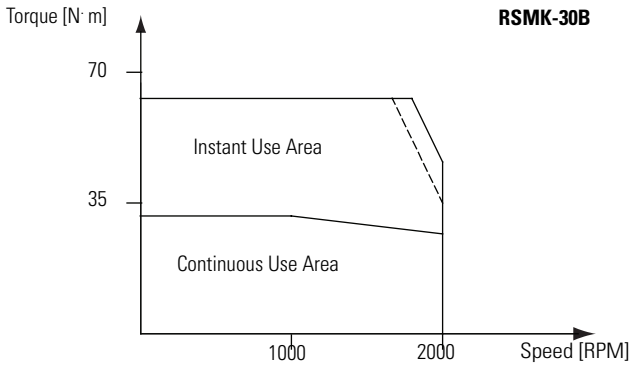


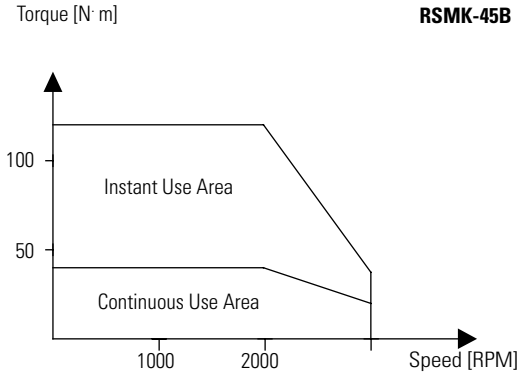


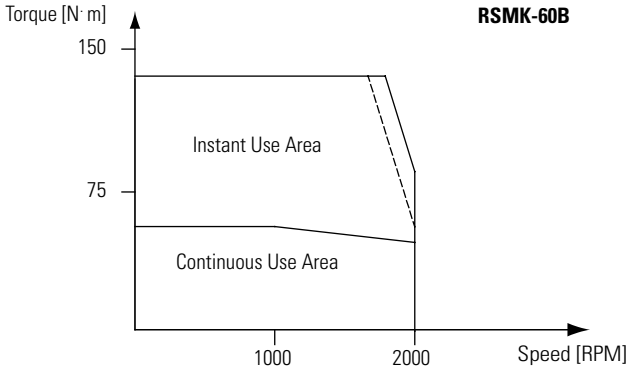









Torque [N· m]
RSMK-45B
100
50
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]


Torque [N· m]
RSMK-60B
150
75
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]

RSML Series Motor

Common Specifications

Table 3.40 RSML Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	5 g (49 $m/s^{2)}$, 10 to 50 Hz. 10 g (98 $m/s^{2)}$, 30- minute Continuous Operation
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Brake Specifications

Table 3.41 RSML Series Motor Brake Specifications

Item	Unit	Applied Motors	
		RSML-03B RSML-06B RSML-09B	RSML-12B RSML-20B RSML-30B RSML-45B RSML-60B
Stiction Torque	N·m	16.5	25
Rotor Inertia	x 10^{-4} Kg·m^2	1.2	4.7
Armature Absorption Time	ms	110	160
Armature Release Time	ms	50	75
Release Voltage	DC, V	2 (at 20℃)	2 (at 20℃)
Excited Voltage	DC, V	24 ± 2.4	24 ± 2.4
Excited Current (cool down)	DC, A	0.876	1.287

- Figures above (except stiction torque, release voltage and excited voltage) are representative characteristics.
- Brake backlash is 1.5 degrees or less.
- Separate power is needed for brake. (No polarity assigned)

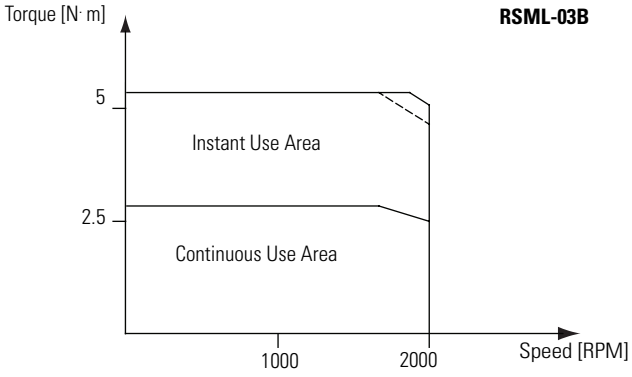
Basic Specifications

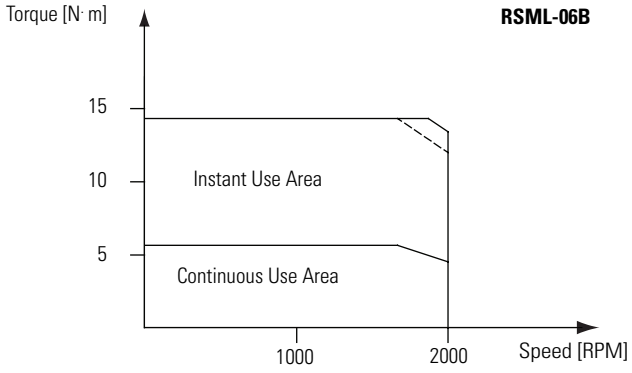
Table 3.42 RSML Series Motor Basic Specifications

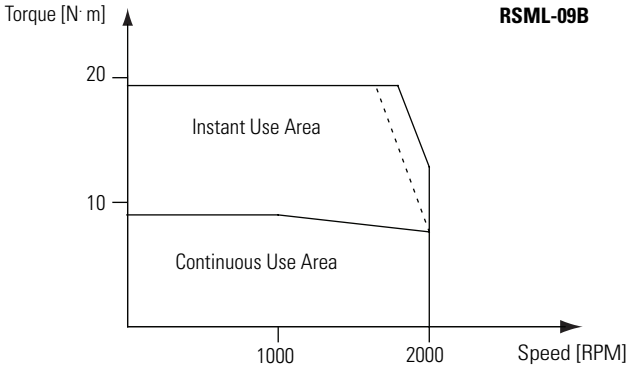
Item	Unit	RSML-							
		03B	**06B**	**09B**	**12B**	**20B**	**30B**	**45B**	**60B**
Flange Size	mm	130	130	130	180	180	180	180	180
Rated Output	kW	0.3	0.6	0.9	1.2	2.0	3.0	4.5	6.0
Rated	%	100							
Rated Revolving Speed	r/min	1000							
Maximum Revolving Speed	r/min	2000							
Rated Torque	N·m	2.84	5.7	8.62	11.5	19.1	28.4	42.9	57.2
	kgf·cm	29	58.2	88	117	198	290	437	583
Instant Maximum Torque	N·m	6.3	14.4	19.3	28	44	63.7	107	129
	kgf·cm	64.3	146.9	197	286	449	650	1091	1315
Rated Current	$A_{(rms)}$	3.5	6.2	7.6	11.6	18.5	24.0	33.0	47.0
Rotator Inertia	x 10^{-4} Kg·m^2	14.5	23.7	39.7	63.3	96.1	131.1	200.6	250.0
	gf·cm·$sec.^2$	14.7	24.2	40.5	64.5	97.9	133.6	204.5	255.1
Rotator Inertia (Brake)	x 10^{-4} Kg·m^2	15.7	25.0	40.8	69.1	102.0	137.1	206.6	256.0
	gf·cm·$sec.^2$	16	25.5	41.6	70.4	103.9	139.8	210.6	261.2
Electric Time Constant	ms	12.7	21	24	31	31	34.5	42	45
Mechanical Time Constant	ms	6.85	3.14	3.0	1.95	2.3	1.77	1.77	1.58
	ms (Brake)	7.42	3.31	3.1	2.13	2.5	1.85	1.82	1.62
Power Rate	kW/s	5.7	14	19.1	21.3	38.8	63.9	94	133
	kW/s (Brake)	5.3	13.3	18.6	19.5	36.5	61.1	91	130
Instant Maximum Current	A (o-p)	11	21.0	24	40.0	60	80.0	118	155
Insulation Grade	-	F							
Vibration Grade	-	V-15							
Paint Color	-	Black							
Mass	kg	6.0	8.0	10.2	16.8	19.4	27.2	37.5	45
	kg (Brake)	7.5	9.6	11.7	20.3	22.9	31.2	43	51
Operation Power Voltage	V_{AC}	200/220							

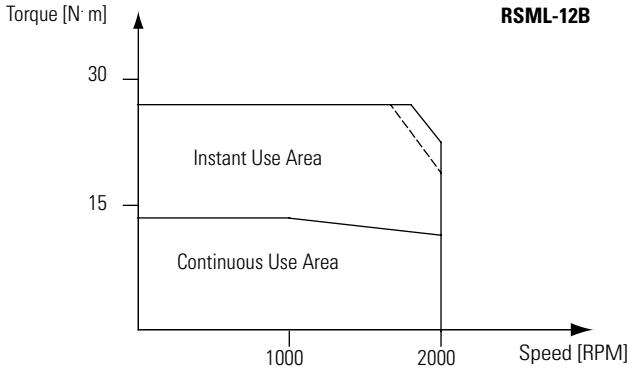
- Characteristics above are representative figures of two-phase sine wave operation.
- Corresponding to IP65 (When outgoing line is in down direction, connector part is not included.)
- Measure at 40℃ ambient with temperature at 65℃ or less at the center of motor frame.

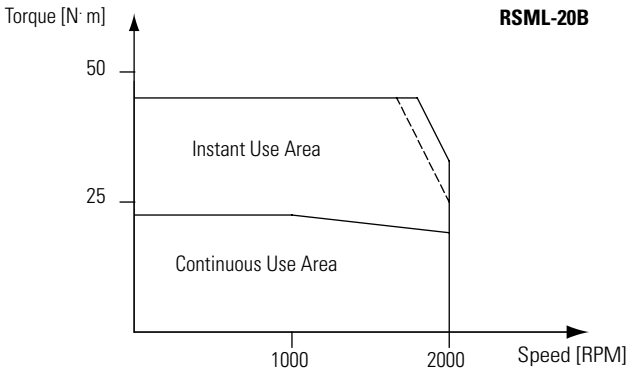
Speed Torque Curve

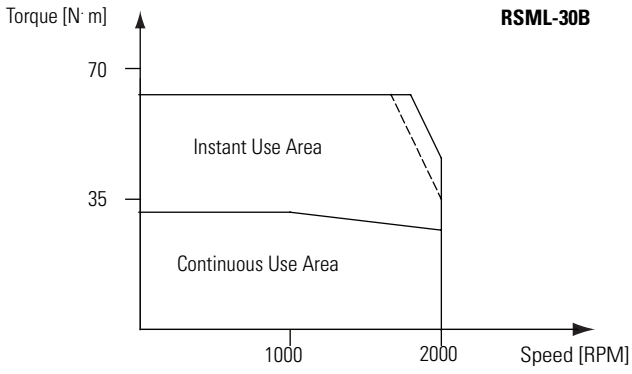


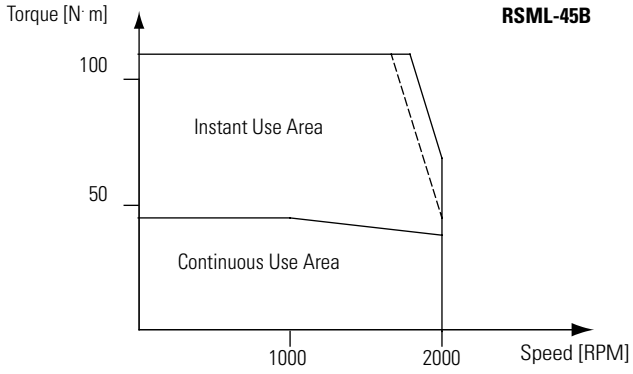


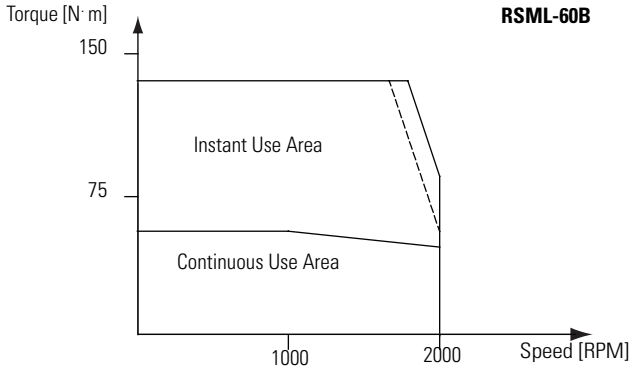









Torque [N· m]
RSML-45B
100
50
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]


Torque [N· m]
RSML-60B
150
75
Instant Use Area
Continuous Use Area
1000
2000
Speed [RPM]

RSMS Series Motor

Common Specifications

Table 3.43 RSMS Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	5 g (49 $m/s^{2)}$, 10 to 50 Hz. 10 g (98 $m/s^{2)}$, 30- minute Continuous Operation
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 VAC 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Brake Specifications

Table 3.44 RSMS Series Motor Brake Specifications

Item	Unit	Applied Motors	
		RSMS-10B RSMS-15B RSMS-20B RSMS-25B RSMS-30B RSMS-35B	RSMS-40B RSMS-45B RSMS-50B
Stiction Torque	N·m	12	16.5
Rotor Inertia	x 10^{-4} Kg·m^2	0.45	1.2
Armature Absorption Time	ms	100	110
Armature Release Time	ms	20	50
Release Voltage	DC, V	2 (at 20℃)	2 (at 20℃)
Excited Voltage	DC, V	24 ± 2.4	24 ± 2.4
Excited Current (cool down)	DC, A	0.83	0.876

- Figures above (except stiction torque, release voltage and excited voltage) are representative characteristics.
- Brake backlash is 1.5 degrees or less.
- Separate power is needed for brake. (No polarity assigned)

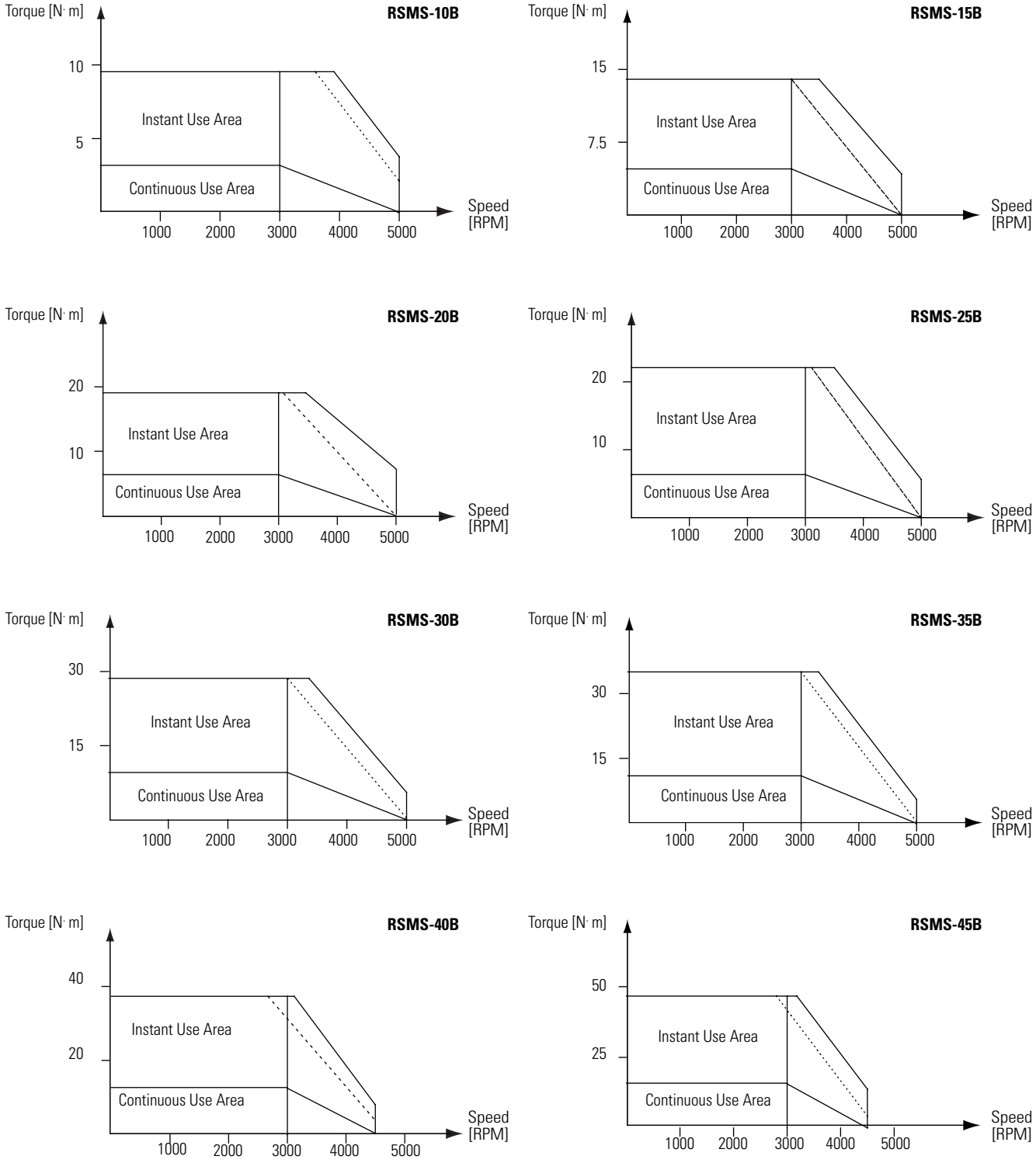
Basic Specifications

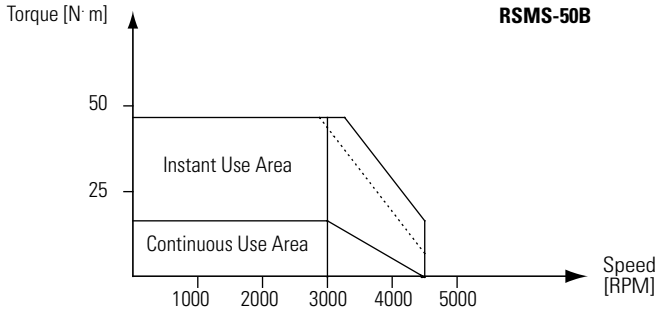
Table 3.45 RSMS Series Motor Basic Specifications

Item	Unit	RSMS-								
		10B	**15B**	**20B**	**25B**	**30B**	**35B**	**40B**	**45B**	**50B**
Flange Size	mm	100	100	100	100	120	120	130	130	130
Rated Output	kW	1.0	1.5	2.0	2.5	3.0	3.5	4.0	4.5	5.0
Rated	%	100								
Rated Revolving Speed	r/min	3000								
Maximum Revolving Speed	r/min	5000						4500		
Rated Torque	N·m	3.18	4.77	6.37	7.96	9.54	11.14	12.7	14.3	15.9
	kgf·cm	32.45	48.7	65.0	81.2	97.35	113.7	130	146	162
Instant Maximum Torque	N·m	9.5	14.5	19.24	23.8	28.59	33.3	37.9	42.9	47.6
	kgf·cm	96.94	148.0	196.3	242.9	291.7	339.8	387	438	486
Rated Current	$A_{(rms)}$	7.2	9.4	13.0	15.9	20	21.6	24.7	29.0	28.5
Rotator Inertia	$x\ 10^{-4}\ Kg{\cdot}m^2$	2.06	2.39	3.04	3.78	5.99	6.93	12.4	13.6	16.0
	$gf{\cdot}cm{\cdot}sec^2$	2.1	2.44	3.10	3.86	6.11	7.07	12.7	13.9	16.3
Rotator Inertia (Brake)	$x\ 10^{-4}\ Kg{\cdot}m^2$	2.5	2.84	3.49	4.23	6.44	7.38	13.7	14.9	17.3
	$gf{\cdot}cm{\cdot}sec^2$	2.55	2.90	3.56	4.32	6.57	7.53	14.0	15.2	17.7
Electric Time Constant	ms	9.19	10.49	11.17	11.10	16.35	20.20	20	25.7	20
Mechanical Time Constant	ms	0.87	0.54	0.53	0.52	0.42	0.38	0.58	0.45	0.48
	ms (Brake)	1.05	0.64	0.60	0.59	0.44	0.41	0.64	0.49	0.52
Power Rate	kW/s	50.08	97.21	136.29	171.16	155.1	183	134	154	161
	kW/s (Brake)	41.3	81.81	118.72	152.95	144.3	172	121	140	149
Instant Maximum Current	A (o-p)	29.7	40.02	56	68.01	79.6	86.25	105	118	120
Insulation Grade	-	F								
Vibration Grade	-	V-15								
Paint Color	-	Black								
Mass	kg	4.5	5.1	6.5	7.5	9.3	10.9	12.9	15.1	17.3
	kg (Brake)	5.1	6.4	7.8	8.8	10.6	12.2	14.8	17.0	19.2
Operation Power Voltage	V_{AC}	200/220								

- Characteristics above are representative figures of two-phase sine wave operation.
- Corresponding to IP65 (When outgoing line is in down direction, connector part is not included.)
- Measure at 40℃ ambient with temperature at 65℃ or less at the center of motor frame.

Speed Torque Curve




Torque [N· m]
RSMS-50B
50
25
Instant Use Area
Continuous Use Area
1000
2000
3000
4000
5000
Speed
[RPM]

RSMQ Series Motor

Common Specifications

Table 3.46 RSMQ Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	5 g (49 $m/s^{2)}$, 10 to 50 Hz. 10 g (98 $m/s^{2)}$, 30- minute Continuous Operation
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Brake Specifications

Table 3.47 RSMQ Series Motor Brake Specifications

Item	Unit	Applied Motors	
		RSMQ-01B	RSMQ-02B RSMQ-04B
Stiction Torque	N·m	1.69	3.25
Rotor Inertia	x 10^{-4} Kg·m^2	0.020	0.075
Armature Absorption Time	ms	50	60
Armature Release Time	ms	15	15
Release Voltage	DC, V	2 (at 20℃)	2 (at 20℃)
Excited Voltage	DC, V	24 ± 2.4	24 ± 2.4
Excited Current (cool down)	DC, A	0.36	0.43

- Figures above (except stiction torque, release voltage and excited voltage) are representative characteristics.
- Brake backlash is 1.5 degrees or less.
- Separate power is needed for brake. (No polarity assigned)

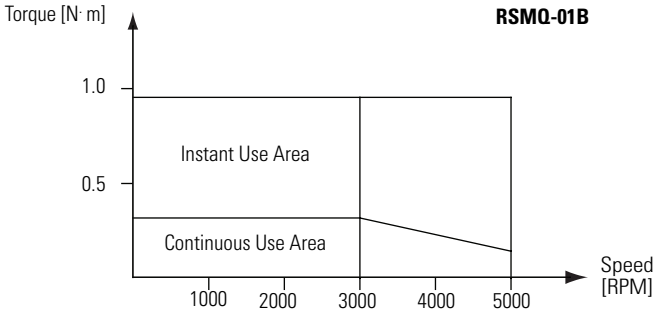
Basic Specifications

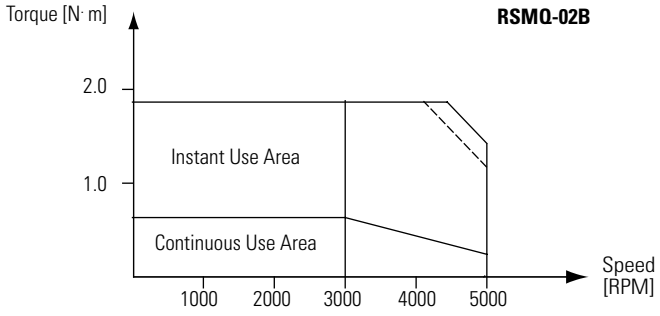
Table 3.48 RSMQ Series Motor Basic Specifications

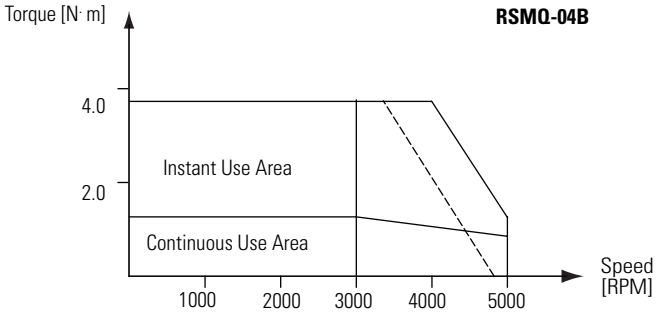
Item	**Unit**	**RSMQ-**		
		01B	**02B**	**04B**
Flange Size	mm	60	80	80
Rated Output	kW	0.1	0.2	0.4
Rated	%	100		
Rated Revolving Speed	r/min	3000		
Maximum Revolving Speed	r/min	5000		
Rated Torque	N·m	0.32	0.64	1.3
	kgf·cm	3.24	6.5	13
Instant Maximum Torque	N·m	0.95	1.91	3.82
	kgf·cm	9.7	19.5	39
Rated Current	$A_{(rms)}$	1.0	1.6	2.5
Rotator Inertia	x 10^{-4} Kg·m^2	0.11/0.10	0.36/0.35	0.62/0.61
2500P/R Inc. /17bit Abs.	gf·cm·$sec.^2$	0.11/0.10	0.37/0.36	0.63/0.62
Rotator Inertia (Brake)	x 10^{-4} Kg·m^2	0.14/0.13	0.49/0.48	0.74/0.74
2500P/R Inc. /17bit Abs.	gf·cm·$sec.^2$	0.14/0.13	0.50/0.49	0.76/0.76
Electric Time Constant	ms	2.9	5.6	6.6
Mechanical Time Constant	ms	1.35/1.22	0.87/0.85	0.62/0.61
2500P/R Inc. /17bit Abs.	ms (Brake)	1.71/1.56	1.17/1.15	0.74/0.74
Power Rate	kW/s	9.4/10.3	11.5/11.8	26.7/27.2
2500P/R Inc. /17bit Abs.	kW/s (Brake)	7.4/8.04	8.5/8.6	22.4/22.4
Instant Maximum Current	A (o-p)	4.30	6.9	10.49
Insulation Grade	-	B		
Vibration Grade	-	V-15		
Paint Color	-	black		
Mass	kg	0.78	1.5	2.1
	kg (Brake)	1.2	2.3	3.0
Operation Power Voltage	V_{AC}	200/220		

- Characteristics above are representative figures of two-phase sine wave operation.
- Corresponding to IP65 (When outgoing line is in down direction, connector part is not included.)
- Measure at 40℃ ambient with temperature at 65℃ or less at the center of motor frame.

Speed Torque Curve







RSMZ Series Motor

Common Specifications

Table 3.49 RSMZ Series Motor Common Specifications

Item	Specifications
Wiring Method	Y Wiring
Operating Temperature Range	0 to +40℃
Storage Temperature Range	-20 to +80℃
Insulation Resistance	500VDC 20 MΩ
Number of Poles	8 Poles
Vibration (At Rated Speed)	5 g (49 $m/s^{2)}$, 10 to 50 Hz. 10 g (98 $m/s^{2)}$, 30- minute Continuous Operation
Impact	98 m/s^2
Time Rating	Continuous Use
Insulation Grade	B Grade
Dielectric Strength	1500 V_{AC} 60 sec. 1800 V_{AC} 1 sec.
Dielectric Strength (Brake)	1200 V_{AC} 1 sec.
Excitation Method	Permanent Magnet
Mounting Method	Flange
Operating Humidity	85% or less (Non-Condensing)

Brake Specifications

Table 3.50 RSMZ Series Motor Brake Specifications

Item	Unit	Applied Motors		
		RSMZ-A3B RSMZ-A5B RSMZ-A8B RSMZ-01B	RSMZ-02B RSMZ-04B	RSMZ-06B RSMZ-08B RSMZ-10B
Stiction Torque	N·m	0.39	1.69	3.25
Rotor Inertia	x 10^{-4} Kg·m^2	0.0025	0.020	0.075
Armature Absorption Time	ms	25	50	60
Armature Release Time	ms	20	15	15
Release Voltage	DC, V	2 (at 20℃)	2 (at 20℃	2 (at 20℃)
Excited Voltage	DC, V	24 ± 2.4	24 ± 2.4	24 ± 2.4
Excited Current (cool down)	DC, A	0.26	0.36	0.43

- Figures above (except stiction torque, release voltage and excited voltage) are representative characteristics.
- Brake backlash is 1.5 degrees or less.
- Separate power is needed for brake. (No polarity assigned)

Basic Specifications

Table 3.51 RSMZ Series Motor Basic Specifications

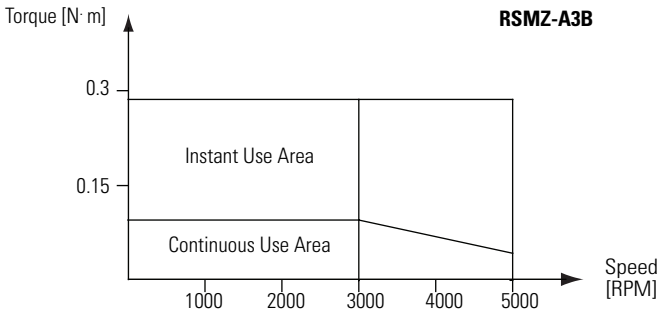
Item	Unit	RSMZ-								
		A3B	**A5B**	**A8B**	**01B**	**02B**	**04B**	**06B**	**08B**	**10B**
Flange Size	mm	40	40	40	40	60	60	80	80	80
Rated Output	kW	0.03	0.05	0.08	0.1	0.2	0.4	0.6	0.75	0.95
Rated	%	100								
Rated Revolving Speed	r/min	3000								
Maximum Revolving Speed	r/min	5000							4500	3500
Rated Torque	N·m	0.095	0.16	0.255	0.32	0.64	1.3	1.91	2.4	3.0
	kgf·cm	0.97	1.62	2.60	3.24	6.5	13	19.49	24.3	30.9
Instant Maximum Torque	N·m	0.28	0.48	0.76	0.95	1.91	3.8	5.73	7.1	9.1
	kgf·cm	2.9	4.9	7.8	9.7	19.5	39	58.47	73	92.6
Rated Current	$A_{(rms)}$	1.0	1.0	1.0	1.0	1.6	2.5	4.1	4.3	4.3
Rotator Inertia 2500P/R Inc. /17bit Abs.	x 10^{-4} Kg·m^2	0.021 /0.015	0.030 /0.024	0.039 /0.034	0.059 /0.054	0.19 /0.18	0.34 /0.33	0.93 /0.92	1.20	1.47
	gf·cm·$sec.^2$	0.021 /0.015	0.031 /0.024	0.040 /0.035	0.060 /0.055	0.19 /0.18	0.35 /0.34	0.95 /0.94	1.22	1.5
Rotator Inertia (Brake) 2500P/R Inc. /17bit Abs.	x 10^{-4} Kg·m^2	0.025 /0.019	0.034 /0.029	0.049 /0.046	0.061 /0.056	0.21 /0.20	0.36 /0.35	1.05 /1.04	1.32	1.49
	gf·cm·$sec.^2$	0.026 /0.019	0.035 /0.030	0.050 /0.047	0.062 /0.057	0.21 /0.20	0.37 /0.36	1.07 /1.06	1.35	1.52
Electric Time Constant	ms	0.6	0.67	0.96	0.88	3.4	3.5	7.3	7.4	7.6
Mechanical Time Constant 2500P/R Inc. /17bit Abs.	ms ms (Brake)	2.74 /1.9	1.58 /1.3	0.85 /0.74	0.90 /0.82	0.84 /0.79	0.59 /0.57	0.4 /0.39	0.44	0.33
		3.27 /2.5	1.80 /1.5	1.07 /1.0	0.93 /0.85	0.92 /0.88	0.63 /0.61	0.45 /0.44	0.50	0.34
Power Rate 2500P/R Inc. /17bit Abs.	kW/s kW/s (Brake)	4.4 /6.2	8.7 /10.9	17.0 /19.5	17.7 /19.4	21.8 /23.0	48.7 /50.2	39.2 /39.7	48.3	62.2
		3.7 /4.9	7.7 /8.9	13.6 /14.4	17.1 /18.7	19.7 /20.7	46.0 /47.4	34.7 /35.1	43.9	61.4
Instant Maximum Current	A (o-p)	4.30	4.30	4.3	4.30	6.89	10.5	17.4	18.3	18.3
Insulation Grade	-	B								
Vibration Grade	-	V-15								

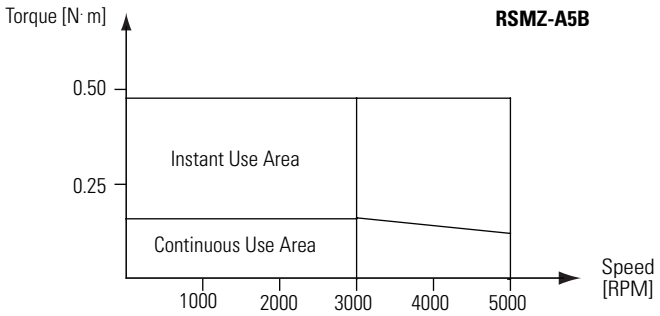
Table 3.51 RSMZ Series Motor Basic Specifications

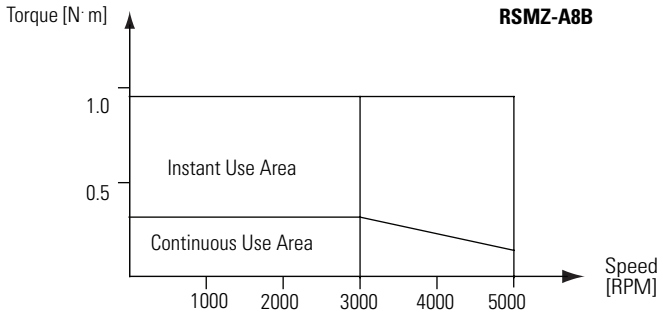
Paint Color	-	black								
Mass	kg	0.32	0.39	0.5	0.66	1.0	1.7	2.9	3.5	4.1
	kg (Brake)	0.54	0.63	0.77	0.93	1.5	2.3	3.5	4.3	4.9
Operation Power Voltage	V_{AC}									

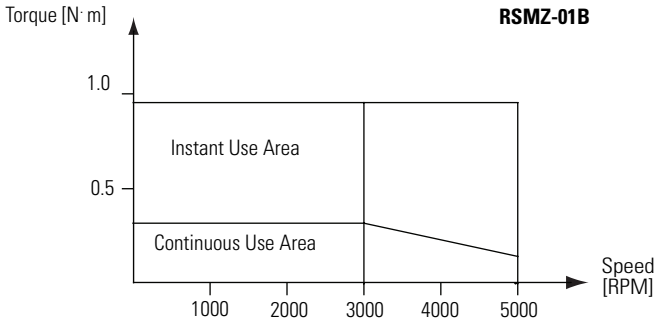
- Characteristics above are representative figures of two-phase sine wave operation.
- Corresponding to IP65 (When outgoing line is in down direction, connector part is not included.)
- Measure at 40℃ ambient with temperature at 65℃ or less at the center of motor frame.

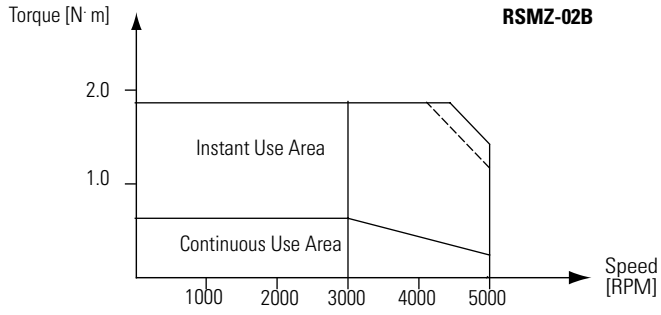
Speed Torque Curve

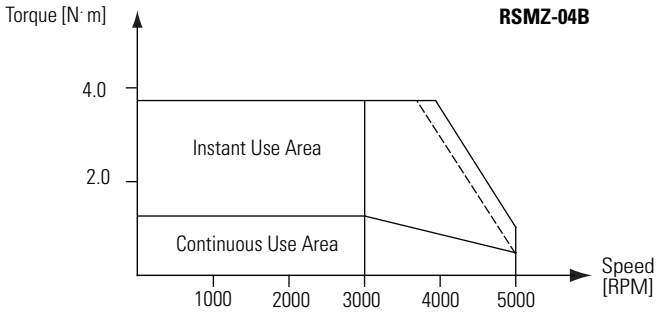


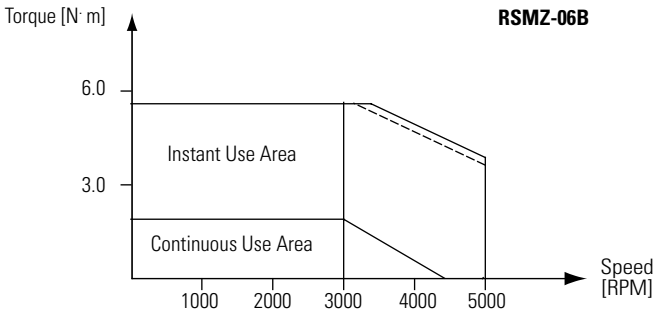


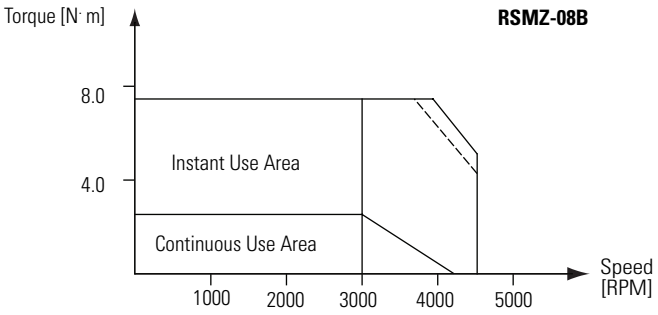


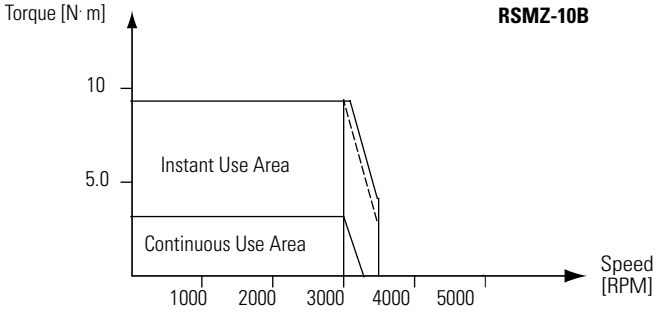






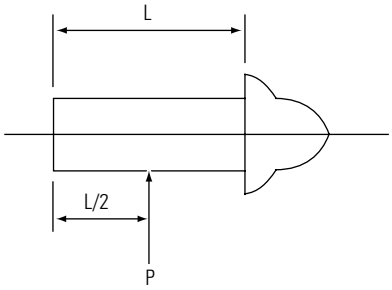




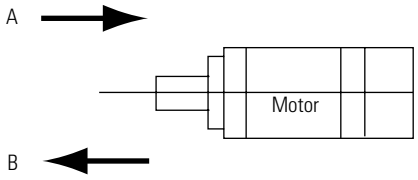


Allowed Load on Motor Shaft

Load Location on Motor Shaft



Radial Load (P) Location



Thrust Load Direction

CSMD/F/H/K/S Series Motor

Table 3.52 CSMD/F/H/K/S Series Motor Allowed Load on Shaft

Motor	Assembly			Running	
	Allowed Radial Load (N)	Allowed Thrust Load (N)		Allowed Radial Load (N)	Allowed Thrust Load (N)
		Direction A	Direction B		
CSMS-10 CSMD-08	686	392	490	392	147
CSMF-04	980	588	686	392	147
CSMS-15 to 35 CSMD-10 to 20 CSMH-05 to 15 CSMF-08 to 15 CSMK-03 to 09	980	588	686	490	196
CSMS-40 to 50 CSMD-25 to 30	980	588	686	784	343
CSMD-35 to 50 CSMH-20 to 50 CSMK-12 to 30	1666	784	980	784	343
CSMF-25 to 45	1862	686	686	184	294
CSMK-45 to 60	2058	980	1176	1176	490

CSMQ/Z Series Motor

Table 3.53 CSMQ/Z Series Motor Allowed Load on Shaft

Motor	Assembly			Running	
	Allowed Radial Load (N)	Allowed Thrust Load (N)		Allowed Radial Load (N)	Allowed Thrust Load (N)
		Direction A	Direction B		
CSMZ-A3	147	88	117.6	49	29.4
CSMZ-A5 to 01 CSMQ-01	147	88	117.	68.6	58
CSMZ-02 to 04 CSMQ-02 to 04	392	147	196	245	98
CSMZ-08	686	294	392	392	147

CSMR/T Series Motor

Table 3.54 CSMR/T Series Motor Allowed Load on Shaft

Motor	Allowed Radial Load [1] (kgf)	Allowed Thrust Load (kgf)
CSMT-A3 to A5 CSMR-01	8	4
CSMT-02 to 04 CSMR-02 to 04	20	7
CSMT-06 to 08	35	10
CSMT-10	35	10

(1) Radial load is measured 20mm away from the surface of flange.

RSMD/F/H/K/L/S Series Motor

Table 3.55 RSMD/F/H/K/L/S Series Motor Allowed Load on Shaft

Motor	Flange Size	Assembly			Running		
		Allowed Radial Load (N)	Allowed Thrust Load (N)		Allowed Radial Load (N)	Allowed Thrust Load (N)	
			Direction A	Direction B		Direction A	Direction B
RSMS-10B to 25B	100	980	588	686	490	196	196
RSMD-08B	120	686	392	490	392	147	147
RSMS-30B to 35B		980	588	686	784	343	343
RSMD-10B to 20B RSMH-05B to 15B RSMK-03B to 09B RSML-03B to 09B	130	980	588	686	490	196	196
RSMD-25B to 30B RSMS-40B to 50B					784	343	343
RSMF-04B					392	147	147
RSMF-08B to 15B	180	980	588	686	490	196	196
RSMH-20B to 50B RSMD-35B to 50B RSMK-12B RSML-12B		1666	784	980	784	343	343
RSMK-20B RSML-20B					1176	490	490
RSMK-30B RSML-30B					1470		
RSMK-45B RSML-45B		2058	980	1176			
RSMK-60B RSML-60B					1764	588	588
RSMF-25B to 45B	220	1862	686	686	784	294	294

RSMQ/Z Series Motor

Table 3.56 RSMQ/Z Series Motor Allowed Load on Shaft

Motor	Flange Size	Assembly			Running		
		Allowed Radial Load (N)	Allowed Thrust Load (N)		Allowed Radial Load (N)	Allowed Thrust Load (N)	
			Direction A	Direction B		Direction A	Direction B
RSMZ-A3	40	147	88	117	49	29	29
RSMZ-A5, A8, 01					68	58	58
RSMQ-01	60						
RSMZ-02, 04		392	147	196	245	98	98
RSMQ-02, 04	80						
RSMZ-06, 08, 10		686	294	392	392	147	147

Motor Diagram and Dimensions

This chapter shows diagrams, dimensions and shaft-end specifications of each servo motor series.

NOTE As for diagram and dimensions of a servo drive, refer to the user manual of the servo drive.

CSM Series Motor

Diagram and Dimensions

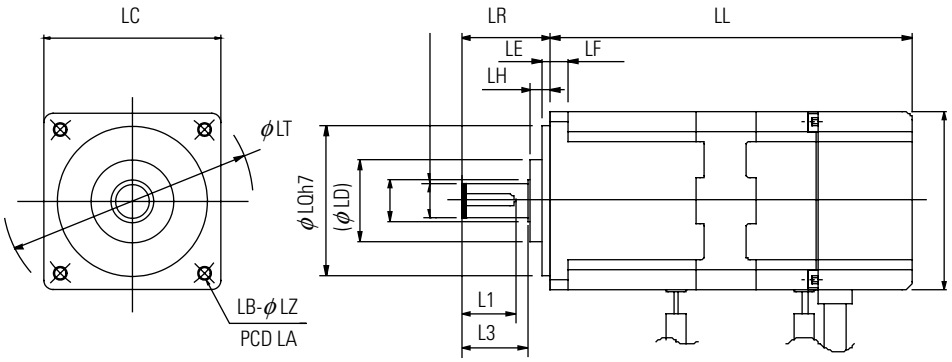


Table 4.1 CSM Series Motor Dimensions

Motor	Dimensions														
	LL		LR	LE	LF	LH	LQ	LD	L1	L3	LC	LT	LB	LZ	LA
	Brake Present	Brake Absent													
CSM-A3B	61.5	92.5	25	2.5	5	4.5	30	20	17	20	40	55	2	4.5	46
CSM-A5B	70.5	101.5													
CSM-01B	88.5	119.5													
CSM-02B	93	122.5	330	3	6	7	50	27	18	22	60	80	4	5.5	70
CSM-04B	121	150.5													
CSM-06B	125	156	35	3	8	7	70	34	23	27	80	105	4	6.5	90
CSM-08B	142	173													
CSM-10B	163	194													

Shaft-End Specifications

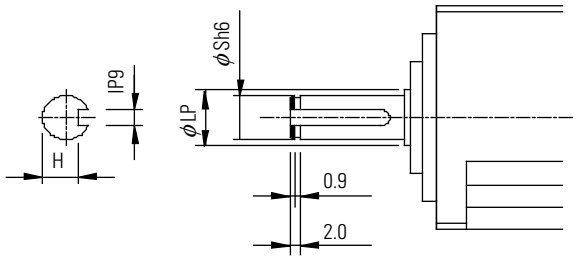


Table 4.2 CSM Series Motor Shaft-End Specifications

Motor	Dimensions			
	LP	**S**	**H**	**I**
CSM-A3B	9	8	6.2	3
CSM-A5B				
CSM-01B				
CSM-02B	14	12	9.5	4
CSM-04B				
CSM-06B	20	16	13	5
CSM-08B				
CSM-10B				

CSM Series Motor - Decelerator Attached

Diagram and Dimensions

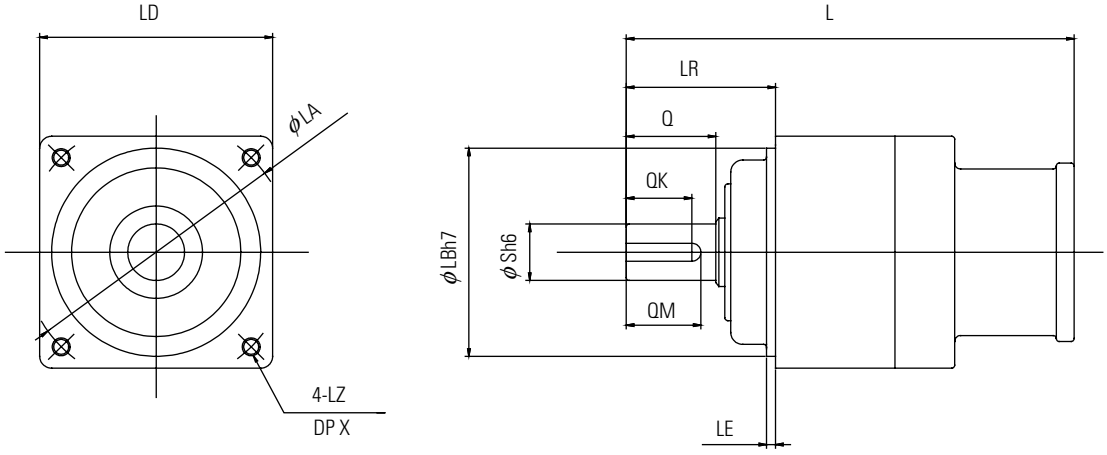


Table 4.3 CSM Series Motor - Decelerator Attached

Motor	Backlash	Speed Reduction Ratio	Dimensions							
			L	LR	LB	LA	LE	LZ	D	X
CSM-A5B	B	1/3	99.5	32	50	60	3	M5	52	12
		1/5								
		1/9	110							
		1/15								
		1/25								
CSM-01B	B	1/3	99.5	32	50	60	3	M5	52	12
		1/5								
		1/9	110							
		1/15								
	C	1/25	142	50	70	90	3	M6	78	20
CSM-02B	B	1/3	104.5	32	50	60	3	M5	52	12
		1/5								
	C	1/9	150	50	70	90	3	M6	78	20
		1/15								
		1/25								
CSM-04B	B	1/3	104.5	32	50	60	3	M5	52	12
	C	1/5	139.5	50	70	90	3	M6	78	20
		1/9	150							
		1/15								
	D	1/25	165	61	90	115	5	M8	96	20

Table 4.3 CSM Series Motor - Decelerator Attached

Motor	Backlash	Speed Reduction Ratio	Dimensions							
			L	LR	LB	LA	LE	LZ	D	X
CSM-06B	C	1/3	143.5	50	70	90	3	M6	78	20
		1/5								
	D	1/9	171	61	90	115	5	M8	96	20
		1/15								
CSM-08B	C	1/3	143.5	50	70	90	3	M6	78	20
		1/5								
	D	1/9	171	61	90	115	5	M8	96	20
		1/15								
	E	1/25	210	75	110	135	5	M10	125	20

Shaft-End Specifications

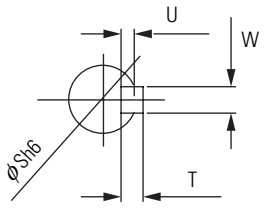


Table 4.4 CSM Series Motor - Shaft-End Specifications with Decelerator Attached

Motor	Backlash	Speed Reduction Ratio	Dimensions					
			Q	QM	QK	S	W×U	T
CSM-A5B	B	1/3	20	18	16	12	4×2.5	4
		1/5						
		1/9						
		1/15						
		1/25						
CSM-01B	B	1/3	20	18	16	12	4×2.5	4
		1/5						
		1/9						
		1/15						
	C	1/25	30	26	22	19	6×3.5	6

Table 4.4 CSM Series Motor - Shaft-End Specifications with Decelerator Attached

Motor	Backlash	Speed Reduction Ratio	Dimensions					
			Q	QM	QK	S	W×U	T
CSM-02B	B	1/3	20	18	16	12	4×2.5	4
		1/5						
	C	1/9	30	26	22	19	6×3.5	6
		1/15						
		1/25						
CSM-04B	B	1/3	20	18	16	12	4×2.5	4
	C	1/5	30	26	22	19	6×3.5	6
		1/9						
		1/15						
	D	1/25	40	35	30	24	8×4	7
CSM-06B	C	1/3	30	26	22	19	6×3.5	6
		1/5						
	D	1/9	40	35	30	24	8×4	7
		1/15						
CSM-08B	C	1/3	30	26	22	19	6×3.5	
		1/5						
	D	1/9	40	35	30	24	8×4	7
		1/15						
	E	1/25	55	52	45	32	10×5	8

CSMT Series Motor Diagram and Dimensions

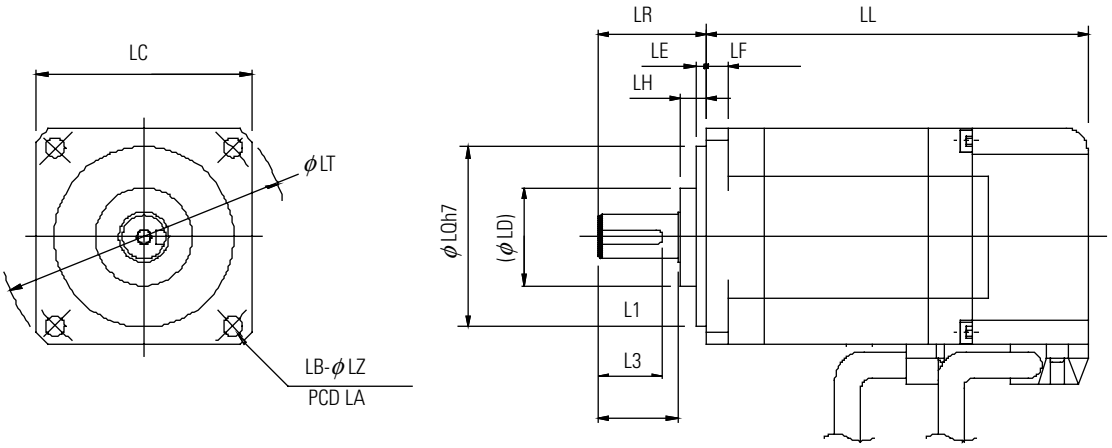


Table 4.5 CSMT Series Motor Dimensions

Motor	Dimensions														
	LL		LR	LE	LF	LH	LQ	LD	L1	L3	LC	LT	LB	LZ	LA
	Brake Present	Brake Absent													
CSMT-A3B	89.1	53.5	25	2.5	5	4.5	30	20	17	20	40	55	2	4.5	46
CSMT-A5B	95.1	59.5													
CSMT-01B	109.1	73.5													
CSMT-02B	110.7	76.1	30	3	6	7	50	27	18	22	60	80	4	5.5	70
CSMT-04B	132.7	98.1													
CSMT-06B	136.3	99.7	35	3	8	7	70	34	23	27	80	105	4	6.6	90
CSMT-08B	145.3	108.7													
CSMT-10B	167.2	144.2	35	3	8	7	80	34	23	27	86	112	4	6.6	100

Shaft-End Specifications

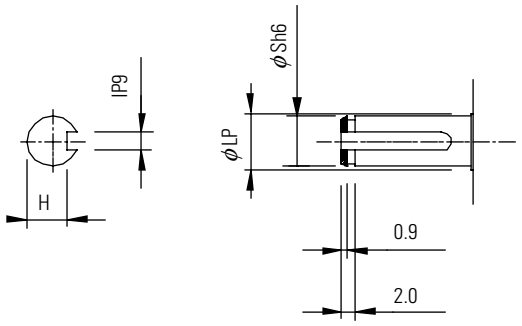


Table 4.6 CSMT Series Motor Shaft-End Specifications

Motor	**Dimensions**			
	LP	**S**	**H**	**I**
CSMT-A3B	8.9	8	6.2	3
CSMT-A5B				
CSMT-01B				
CSMT-02B	14	12	9.5	4
CSMT-04B				
CSMT-06B	19.8	16	13	5
CSMT-08B				
CSMT-10B				

CSMR Series Motor Diagram and Dimensions

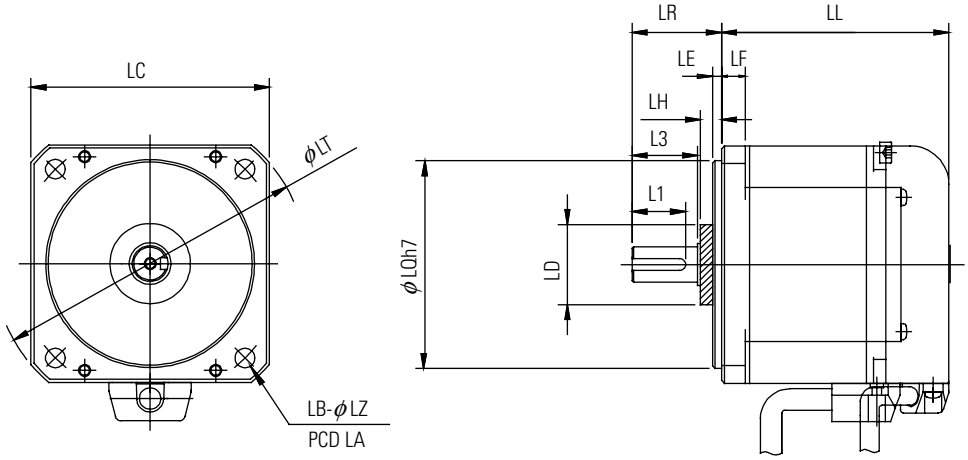


Table 4.7 CSMR Series Motor Dimensions

Motor	Dimensions														
	LL		LR	LE	LF	LH	LQ	LD	L1	L3	LC	LT	LB	LZ	LA
	Brake Present	Brake Absent													
CSMR-01B	86.5	62.5	30	3	6	7	50	27	18	22	60	80	4	5.5	70
CSMR-02B	95.3	64.3	30	3	8	7	70	27	18	22	80	105	4	6.6	90
CSMR-04B	107.3	76.3													

Shaft-End Specifications

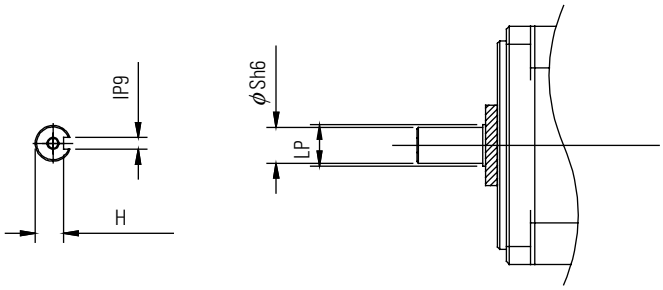


Table 4.8 CSMR Series Motor Shaft-End Specifications

Motor	Dimensions			
	LP	S	H	I
CSMR-01B	14	12	9.5	4
CSMR-02B				
CSMR-04B				

CSMQ Series Motor

Diagram and Dimensions

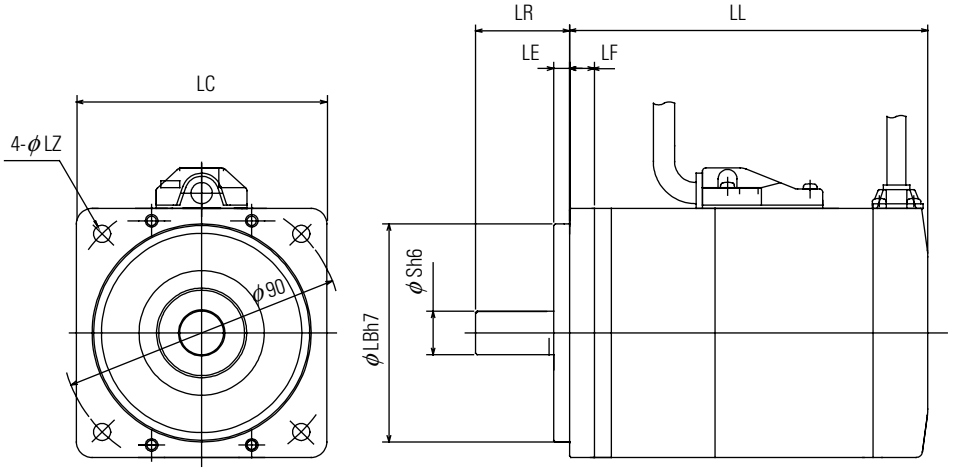


Table 4.9 CSMQ Series Motor Dimensions

Motor	Dimensions									
	LL		LR	S	LA	LB	LC	LE	LF	LZ
	Brake Present	Brake Absent								
CSMQ-01B	84	60	25	8	70	50	60	3	7	4.5
CSMQ-02B	99.5	67	30	11	90	70	80	5	8	5.5
CSMQ-04B	114.5	82	30	14	90	70	80	5	8	5.5

Shaft-End Specifications

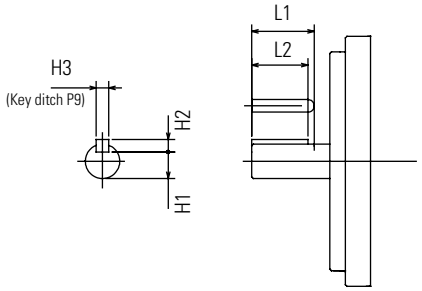


Table 4.10 CSMQ Series Motor Shaft-End Specifications

Motor	Dimensions				
	L1	L2	H1	H2	H3
CSMQ-01B	14	12.5	6.2	3	3
CSMQ-02B	20	18	8.5	4	4
CSMQ-04B	25	22.5	11	5	5

CSMZ Series Motor Diagram and Dimensions

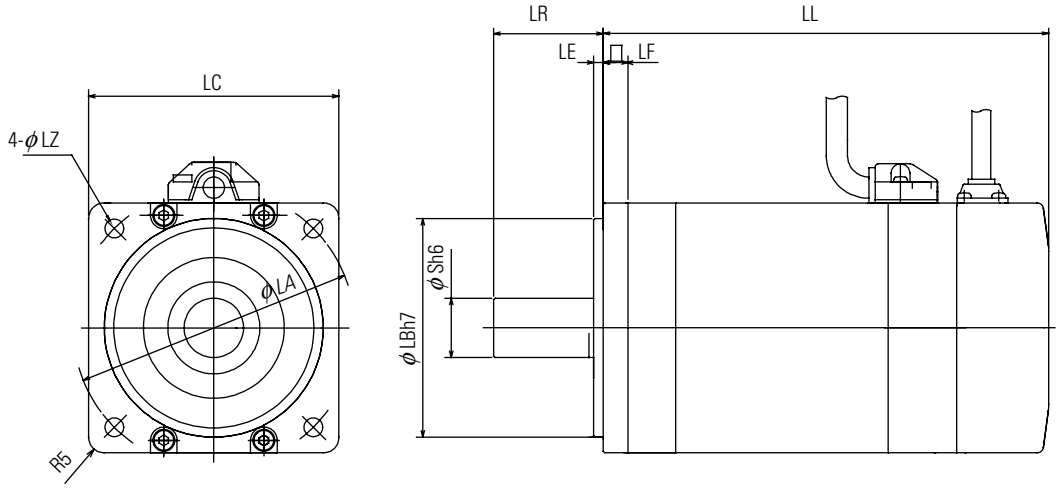


Table 4.11 CSMZ Series Motor Dimensions

Motor	Dimensions											
	LL				LR	S	LA	LB	LC	LE	LF	LZ
	Brake Present		Brake Absent									
	Abs.	Inc.	Abs.	Inc.								
CSMZ-A3D	122	97	90	65	25	7	45	30	38	3	6	3.4
CSMZ-A5D	130	105	98	73	25	8	45	30	38	3	6	3.4
CSMZ-01B	160	135	128	103	25	8	45	30	38	3	6	3.4
CSMZ-02B	152	127	119	94	30	11	70	50	60	3	7	4.5
CSMZ-04B	181.5	156.5	148.5	123.5	30	14	70	50	60	3	7	4.5
CSMZ-08B	202.5	177.5	167.5	142.5	35	19	90	70	60	3	8	6

Shaft-End Specifications

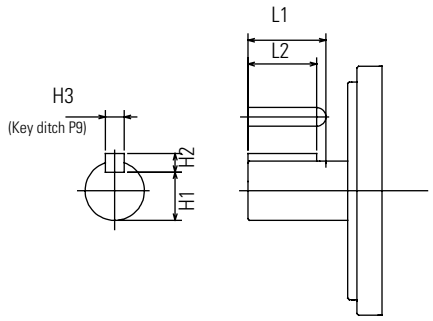


Table 4.12 CSMZ Series Motor Shaft-End Specifications

Motor	**Dimensions**				
	L1	**L2**	**H1**	**H2**	**H3**
CSMZ-A3D	13	12	5.8	2	2
CSMZ-A5D	14	12.5	6.2	3	3
CSMZ-01B	14	12.5	6.2	3	3
CSMZ-02B	20	18	8.5	4	4
CSMZ-04B	25	22.5	11	5	5
CSMZ-08B	25	22	15.5	6	6

RSMZ/Q Series Motor Diagram and Dimensions

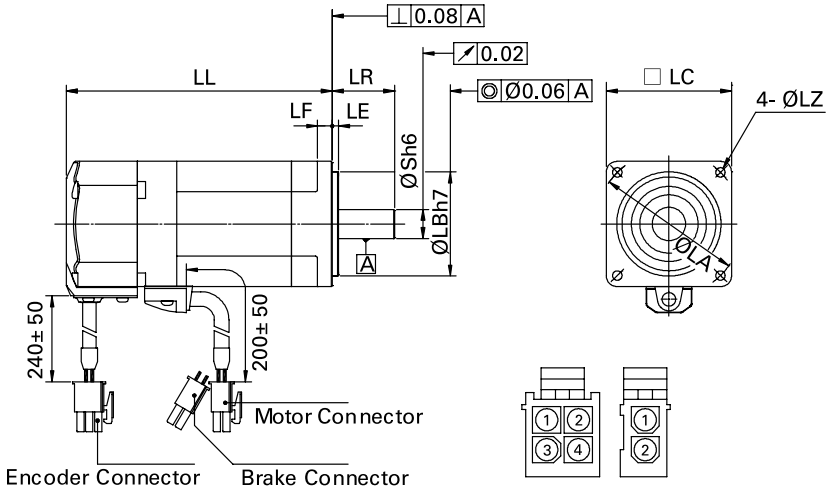


Table 4.13 RSMZ Series Motor Dimensions

Motor	Dimensions											
	LL				LR	S	LA	LB	LC	LE	LF	LZ
	Brake Present		Brake Absent									
	Abs.	Inc.	Abs.	Inc.								
RSMZ-A3B	104.5	92	73.5	60	25	7	45	30	40	3	6	3.6
RSMZ-A5B	112.5	100	81.5	68	25	8	45	30	40	3	6	3.6
RSMZ-A8B	132.5	120	101.5	88	25	8	45	30	40	3	6	3.6
RSMZ-01B	142.5	130	111.5	98	25	8	45	30	40	3	6	3.6
RSMZ-02B	130.5	118	98	84.5	30	11	70	50	60	3	7	5.5
RSMZ-04B	160	147.5	127.5	114	30	14	70	50	60	3	7	5.5
RSMZ-06B	163	150	128	115	35	16	90	70	80	3	8	6.6
RSMZ-08B	181	168	146	133	35	19	90	70	80	3	8	6.6
RSMZ-10B	199	186	164	151	35	19	90	70	80	3	8	6.6

Table 4.14 RSMQ Series Motor Dimensions

Motor	Dimensions											
	LL				LR	S	LA	LB	LC	LE	LF	LZ
	BRAKE 有		BRAKE 無									
	Abs.	Inc.	Abs.	Inc.								
RSMQ-01B	118	105.5	85.5	72	25	8	70	50	60	3	7	5.5
RSMQ-02B	131	118	96	83	30	11	90	70	80	3	8	6.6
RSMQ-04B	146	133	111	98	30	14	90	70	80	3	8	6.6

Shaft-End Specifications

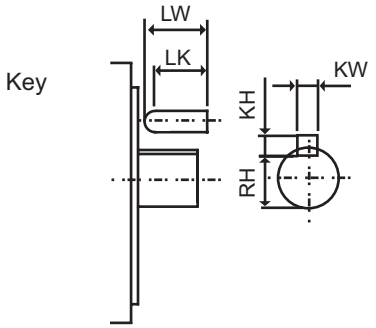


Table 4.15 RSMZ Series Motor Shaft-End Specifications

Motor	Dimensions				
	LW/ LN (D-cut)	LK	KW	KH	RH/ LP (D-cut)
RSMZ-A3B	13	12	2h9	2	5.8
RSMZ-A5B	14	12.5	3h9	3	6.2
RSMZ-A8B	14	12.5	3h9	3	6.2
RSMZ-01B	14	12.5	3h9	3	6.2
RSMZ-02B	20	18	4h9	4	8.5
RSMZ-04B	25	22.5	5h9	5	11
RSMZ-06B	25	22	6h9	6	12.5
RSMZ-08B	25	22	6h9	6	15.5
RSMZ-10B	25	22	6h9	6	15.5

Table 4.16 RSMQ Series Motor Shaft-End Specifications

Motor	**Dimensions**				
	LW/ LN (D-cut)	**LK**	**KW**	**KH**	**RH/ LP (D-cut)**
RSMQ-01B	14	12.5	3h9	3	6.2
RSMQ-02B	20	18	4h9	4	8.5
RSMQ-04B	25	22.5	5h9	5	11

CSMD/H/K/S Series Motor Diagram and Dimensions

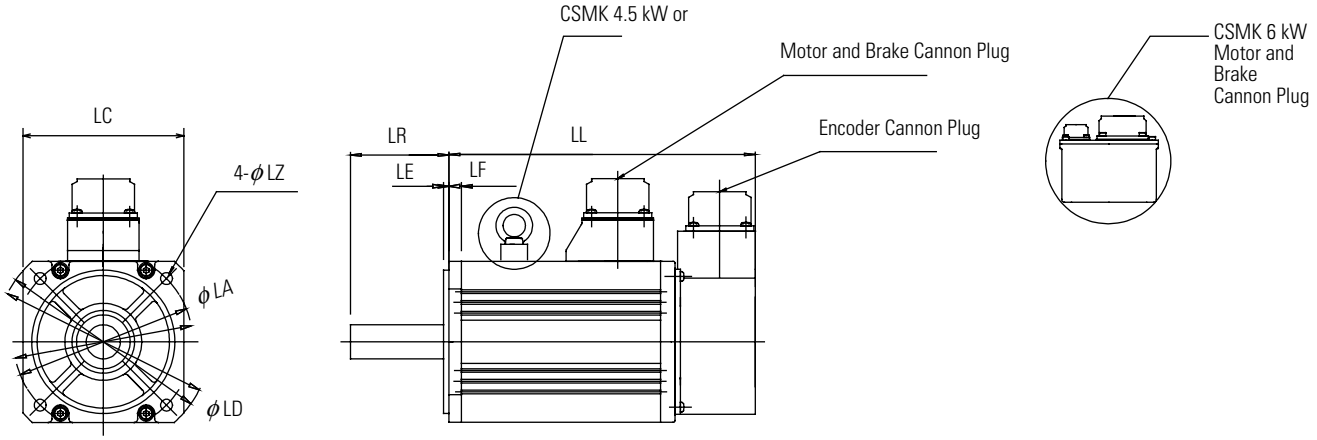


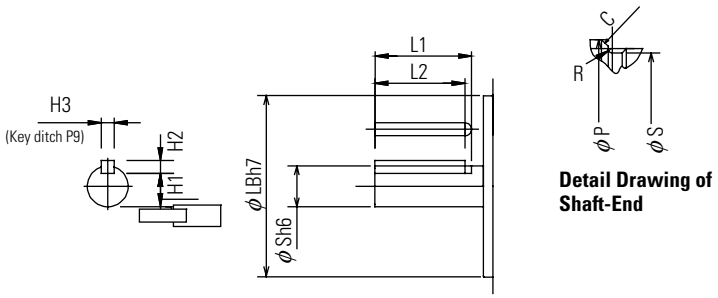
Table 4.17 CSMD/H/K/S Series Motor Dimensions

Motor	Dimensions										
	LL				LR	LA	LC	LD	LE	LF	LZ
	Brake Present		Brake Absent								
	Abs.	Inc.	Abs.	Inc.							
CSMD-08B	198	169	173	144	55	130,145	120	162	3	10	9
CSMD-10B	201	172	176	147	55	145	130	165	6	12	9
CSMD-15B	226	197	201	172	55	145	130	165	6	12	9
CSMD-20B	251	222	226	197	55	145	130	165	6	12	9
CSMD-25B	276	247	251	222	65	145	130	165	6	12	9
CSMD-30B	301	272	276	247	65	145	130	165	6	12	9
CSMD-35B	283	254	258	229	65	165	150	190	3.2	18	11
CSMD-40B	303	274	278	249	65	165	150	190	3.2	18	11
CSMD-45B	256	227	231	222	70	200	180	233	3.2	18	13.5
CSMD-50B	276	247	251	222	70	200	180	233	3.2	18	13.5
CSMH-10B	226	197	201	172	70	145	130	165	6	12	9
CSMH-15B	251	222	226	197	70	145	130	165	6	12	9
CSMH-20B	241	212	231	187	80	200	180	233	3.2	18	13.5
CSMH-30B	256	227	231	202	80	200	180	233	3.2	18	13.5
CSMH-40B	281	252	256	227	80	200	180	233	3.2	18	13.5
CSMH-50B	306	277	281	252	80	200	180	233	3.2	18	13.5
CSMK-03B		158		133	70	145	130	165	6	12	9
CSMK-06B		183		158	70	145	130	165	6	12	9
CSMK-09B		208		183	70	145	130	165	6	12	9

Table 4.17 CSMD/H/K/S Series Motor Dimensions

Motor	Dimensions										
	LL				LR	LA	LC	LD	LE	LF	LZ
	Brake Present		Brake Absent								
	Abs.	Inc.	Abs.	Inc.							
CSMK-12B		195		170	80	200	176	233	3.2	18	13.5
CSMK-20B		162		190	80	200	176	233	3.2	18	13.5
CSMK-30B		208		230	80	200	176	233	3.2	18	13.5
CSMK-45B		353.5		308.5	113	200	176	233	3.2	24	13.5
CSMK-60B		393.5		348.5	113	200	176	233	3.2	24	13.5
CSMS-10B	226	197	201	172	55	100	90	120	3	7	6.6
CSMS-15B	231	202	206	177	55	115	100	135	3	10	9
CSMS-20B	256	227	231	202	55	115	100	135	3	10	9
CSMS-25B	281	252	256	227	55	115	100	135	3	10	9
CSMS-30B	268	239	243	214	55	130,145	120	162	3	10	9
CSMS-35B	288	259	263	234	55	130,145	120	162	3	10	9
CSMS-40B	291	262	266	237	65	145	130	165	6	12	9
CSMS-45B	311	282	286	257	65	145	130	165	6	12	9
CSMS-50B	331	302	306	277	65	145	130	165	6	12	9

Shaft-End Specifications



Detail Drawing of Shaft-End

Table 4.18 CSMS/D/H/K Series Motor Shaft-End Specifications

Motor	Dimensions									
	L1	**L2**	**S**	**LB**	**H1**	**H2**	**H3**	**C**	**R**	**P**
CSMS-10	45	42	19	80	15.5	6	6	0.3	0.6 to 1.1	19.8
CSMS-15 to 25	45	42	19	95	15.5	6	6	0.3	0.6 to 1.1	19.8
CSMS-30, 35	45	41	22	110	18	7	8	0.5	0.6 to 1.1	24
CSMS-40 to 50	55	51	24	110	20	7	8	0.5	0.6 to 1.1	No Step
CSMD-08	45	42	19	110	15.5	6	6	0.5	0.6 to 1.1	24
CSMD-10 to 20	45	41	22	110	18	7	8	0.5	0.6 to 1.1	24
CSMD-25, 30	55	51	24	110	20	7	8	0.5	0.6 to 1.1	No Step
CSMD-35, 40	55	51	28	130	24	7	8	0.5	0.6 to 1.1	29.8
CSMD-45, 50	55	50	35	114.3	30	8	10	0.5	0.6 to 1.1	39.8
CSMH-05 to 15	45	41	22	110	18	7	8	0.5	0.6 to 1.1	24
CSMH-20 to 50	55	50	35	114.3	30	8	10	0.5	0.6 to 1.1	39.8
CSMK-03 to 09	45	41	22	110	18	7	8	0.5	0.6 to 1.1	24
CSMK-12 to 30	55	50	35	114.3	30	8	10	0.5	0.6 to 1.1	39.8
CSMK-45, 60	96	90	42	114.3	37	8	12	-	-	-

RSMD/S/H/F Series Motor Diagram and Dimensions

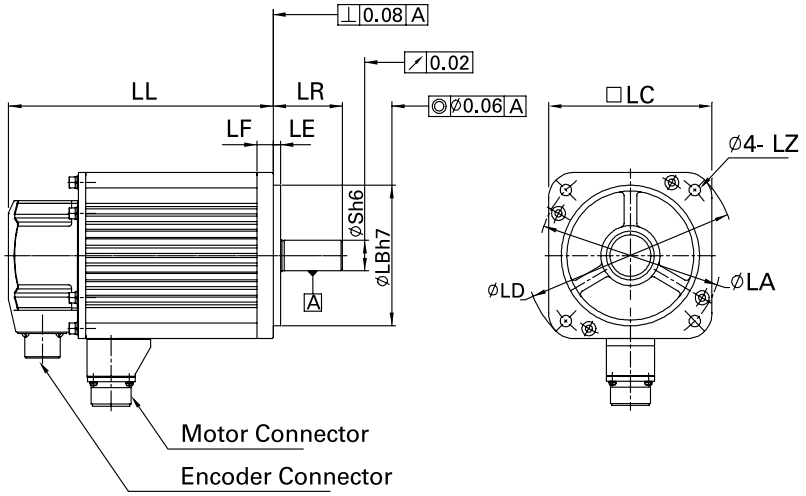


Table 4.19 RSMD Series Motor Dimensions

Motor	Dimensions												
	LL				LR	S	LA	LB	LC	LD	LE	LF	LZ
	Brake Present		Brake Absent										
	Abs.	Inc.	Abs.	Inc.									
RSMD-08B	169.5	169.5	144.5	144.5	55	19	130/145	110	120	162	3	12	9
RSMD-10B	183	183	158	158	55	22	145	110	130	165	6	12	9
RSMD-15B	208	208	183	183	55	22	145	110	130	165	6	12	9
RSMD-20B	233	233	208	208	55	22	145	110	130	165	6	12	9
RSMD-25B	258	258	233	233	65	24	145	110	130	165	6	12	9
RSMD-30B	283	283	258	258	65	24	145	110	130	165	6	12	9
RSMD-35B	223	223	198	198	65	28	200	114.3	180	230	3.2	18	13.5
RSMD-40B	228	228	203	203	65	28	200	114.3	180	230	3.2	18	13.5
RSMD-45B	238	238	213	213	70	35	200	114.3	180	230	3.2	18	13.5
RSMD-50B	258	258	233	233	70	35	200	114.3	180	230	3.2	18	13.5

Table 4.20 RSMS Series Motor Dimensions

Motor	Dimensions												
	LL				LR	S	LA	LB	LC	LD	LE	LF	LZ
	Brake Present		Brake Absent										
	Abs.	Inc.	Abs.	Inc.									
RSMS-10B	182.5	182.5	162.5	162.5	55	19	115	95	100	135	3	10	9
RSMS-15B	207.5	207.5	187.5	187.5	55	19	115	95	100	135	3	10	9
RSMS-20B	230.5	230.5	210.5	210.5	55	19	115	95	100	135	3	10	9
RSMS-25B	255.5	255.5	235.5	235.5	55	19	115	95	100	135	3	10	9
RSMS-30B	239.5	239.5	214.5	214.5	55	22	130/145	110	120	162	3	12	9
RSMS-35B	259.5	259.5	234.5	234.5	55	22	130/145	110	120	162	3	12	9
RSMS-40B	273	273	248	248	65	24	145	110	130	165	6	12	9
RSMS-45B	293	293	268	268	65	24	145	110	130	165	6	12	9
RSMS-50B	313	313	288	288	65	24	145	110	130	165	6	12	9

Table 4.21 RSMH Series Motor Dimensions

Motor	Dimensions												
	LL				LR	S	LA	LB	LC	LD	LE	LF	LZ
	Brake Present		Brake Absent										
	Abs.	Inc.	Abs.	Inc.									
RSMH-05B	183	183	158	158	70	22	145	110	130	165	6	12	9
RSMH-10B	208	208	183	183	70	22	145	110	130	165	6	12	9
RSMH-15B	233	233	208	208	70	22	145	110	130	165	6	12	9
RSMH-20B	225	225	200	200	80	35	200	114.3	180	230	3.2	18	13.5
RSMH-30B	240	240	215	215	80	35	200	114.3	180	230	3.2	18	13.5
RSMH-40B	255	255	230	230	80	35	200	114.3	180	230	3.2	18.0	13.5
RSMH-50B	285	285	260	260	80	35	200	114.3	180	230	3.2	18.0	13.5

Table 4.22 RSMF Series Motor Dimensions

Motor	Dimensions												
	LL				LR	S	LA	LB	LC	LD	LE	LF	LZ
	Brake Present		Brake Absent										
	Abs.	Inc.	Abs.	Inc.									
RSMF-04B	153	153	128	128	55	19	145	110	130	165	6	12	9
RSMF-08B	160	160	135	135	55	22	200	114.3	180	230	3.2	18	13.5
RSMF-15B	180	180	155	155	65	35	200	114.3	180	230	3.2	18	13.5
RSMF-25B	177	177	146	146	65	35	235/250	200.0	220	268	4	16	13.5
RSMF-35B	186	186	155	155	65	35	235/250	200.0	220	268	4	16	13.5
RSMF-45B	202	202	171	171	70	35	235/250	200.0	220	268	4	16	13.5

Shaft-End Specifications

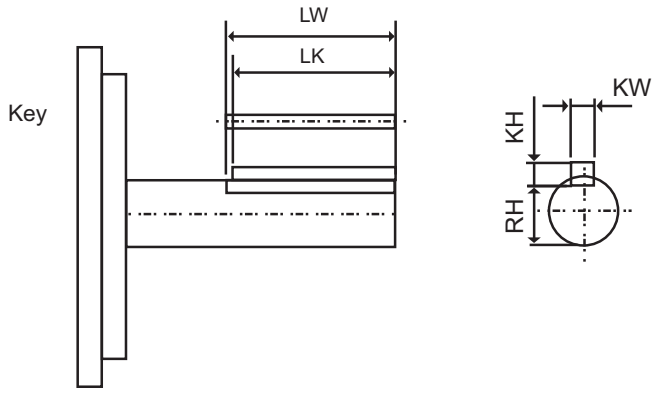


Table 4.23 RSMD Series Motor Shaft-End Specifications

Motor	Dimensions				
	LW	**LK**	**KW**	**KH**	**RH**
RSMD-08B	45	42	6h9	6	15.5
RSMD-10B to 20B	45	41	8h9	7	18
RSMD-25B to 30B	55	51	8h9	7	20
RSMD-35B to 40B	55	51	8h9	7	24
RSMD-45B to 50B	55	50	10h9	8	30

Table 4.24 RSMS Series Motor Shaft-End Specifications

Motor	Dimensions				
	LW	**LK**	**KW**	**KH**	**RH**
RSMS-10B to 25B	45	42	6h9	6	15.5
RSMS-30B to 35B	45	41	8h9	7	18
RSMS-40B to 50B	55	51	8h9	7	20

Table 4.25 RSMH Series Motor Shaft-End Specifications

Motor	Dimensions				
	LW	**LK**	**KW**	**KH**	**RH**
RSMH-05B to 15B	45	41	8h9	7	18
RSMH-20B to 50B	55	50	10h9	8	30

Table 4.26 RSMF Series Motor Shaft-End Specifications

Motor	**Dimensions**				
	LW	**LK**	**KW**	**KH**	**RH**
RSMF-04B	45	42	6h9	6	15.5
RSMF-08B	45	41	8h9	7	18
RSMF-15B to 45B	55	50	10h9	8	30

RSMK/L Series Motor Diagram and Dimensions

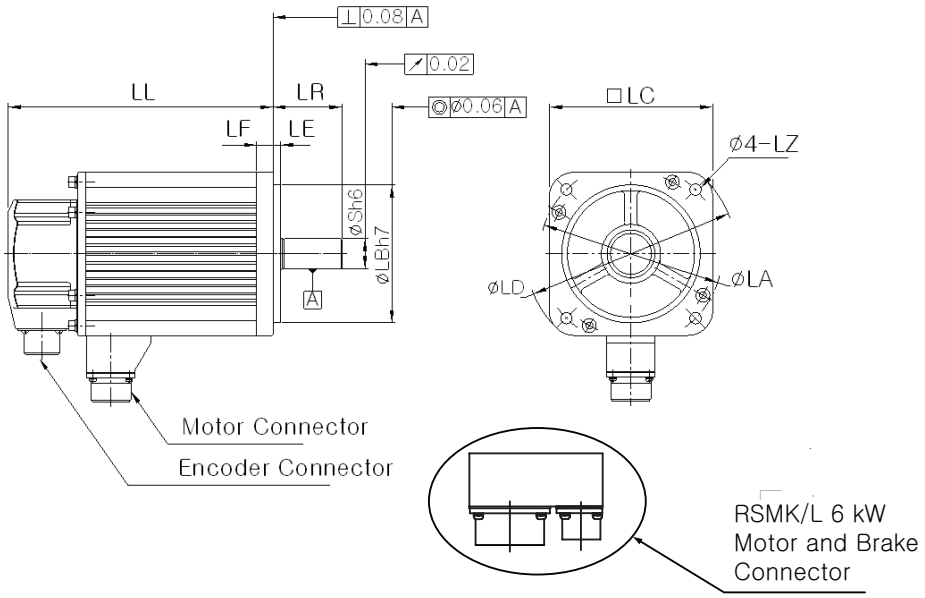


Table 4.27 RSMK Series Motor Dimensions

Motor	Dimensions												
	LL				LR	S	LA	LB	LC	LD	LE	LF	LZ
	Brake Present		Brake Absent										
	Abs.	Ins.	Abs.	Ins.									
RSMK-03B	158	158	133	133	70	22	145	110	130	165	6	12	9
RSMK-06B	183	183	158	158	70	22	145	110	130	165	6	12	9
RSMK-09B	208	208	183	183	70	22	145	110	130	165	6	12	9
RSMK-12B	208	208	183	183	80	35	200	114.3	180	230	3.2	18	13.5
RSMK-20B	228	228	203	203	80	35	200	114.3	180	230	3.2	18	13.5
RSMK-30B	268	268	243	243	80	35	200	114.3	180	230	3.2	18	13.5
RSMK-45B	334.2	334.2	309.2	309.2	113	42	200	114.3	180	230	3.2	20	13.5
RSMK-60B	389.2	389.2	364.2	364.2	113	42	200	114.3	180	230	3.2	20	13.5

Table 4.28 RSML Series Motor Dimensions

Motor	Dimensions												
	LL				LR	S	LA	LB	LC	LD	LE	LF	LZ
	Brake Present		Brake Absent										
	Abs.	Ins.	Abs.	Ins.									
RSML-03B	183	183	158	158	55	22	145	110	130	165	6	12	9
RSML-06B	208	208	183	183	55	22	145	110	130	165	6	12	9
RSML-09B	233	233	208	208	55	22	145	110	130	165	6	12	9
RSML-12B	232	232	207	207	80	35	200	114.3	180	230	3.2	18	13.5
RSML-20B	252	252	227	227	80	35	200	114.3	180	230	3.2	18	13.5
RSML-30B	292	292	267	267	80	35	200	114.3	180	230	3.2	18	13.5
RSML-45B	359.6	359.6	334.6	334.6	113	42	200	114.3	180	230	3.2	20	13.5
RSML-60B	414.6	414.6	389.6	389.6	113	42	200	114.3	180	230	3.2	20	13.5

Shaft-End Specifications

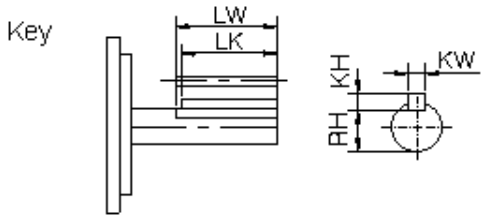


Table 4.29 RSMK Series Motor Shaft-End Specifications

Motor	Dimensions				
	LW	LK	KW	KH	RH
RSMK-03B to 09B	45	41	8h9	7	18
RSMK-12B to 30B	55	50	10h9	8	30
RSMK-45B to 60B	96	90	12h9	8	37

Table 4.30 RSML Series Motor Shaft-End Specifications

Motor	**Dimensions**				
	LW	**LK**	**KW**	**KH**	**RH**
RSML-03B to 09B	45	41	8h9	7	18
RSML-12B to 30B	55	50	10h9	8	30
RSML-45B to 60B	96	90	12h9	8	37

Cable Specifications

This appendix describes specifications and order codes of the following cables.

- Motor 3-Phase Power Cable
- Encoder Cable
- Motor Brake Cable

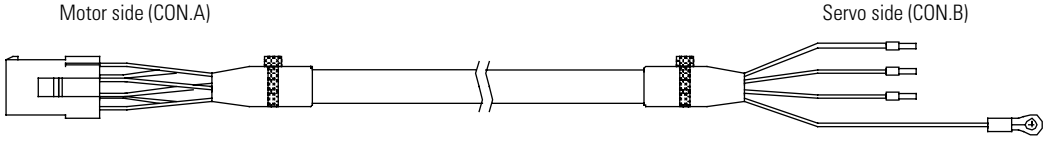
NOTE For specifications and order codes for the cables, refer to the user manual of the servo drive.

- I/O Cable
- Communication Cable

Motor 3-Phase Power Cable

Motor 3-Phase Power Cable

CSD3+ Small Capacity (CSM, CSMT/R/Q/Z, RSMQ/Z)



CSDJ+ Small Capacity (CSM, CSMT/R/Q/Z, RSMQ/Z)

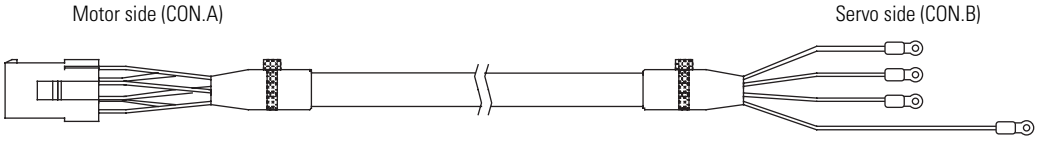


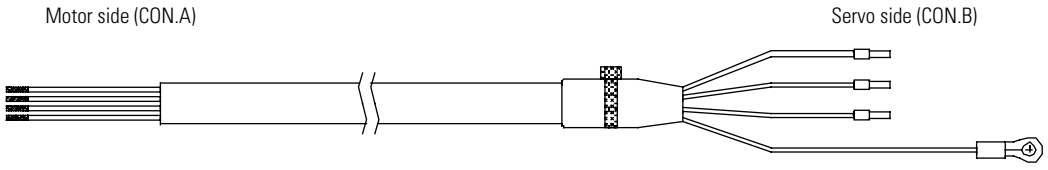
Table 5.1 Motor 3-Phase Power Cable Specifications – small capacity (CSM, CSMT/R/Q/Z, RSMQ/Z)

CON.A	CON.B	Color	Type
1	U	Red	3-Core Cable
2	V	White	3-Core Cable
3	W	Black	3-Core Cable
4	FG	Yellow stripes on green background FG Wire	Solder the shield of 3-core cable

Table 5.2 Connector Specifications

Item	Description	Specifications	Manufacturer	Amount
CON. A	Housing	172159-1	AMP	1 EA
	Terminal	170362-1 (or 170366-1)	AMP	4 EA

CSD3+ Large Capacity (CSMD/H/K/S, RSMS/D/H/F/K/L) for



CSDJ+/CSDP+ Large Capacity (CSMD/H/K/S, RSMS/D/H/F/K/L)

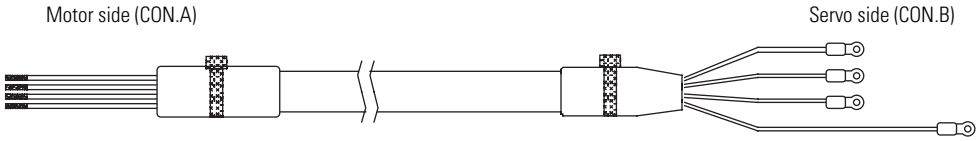
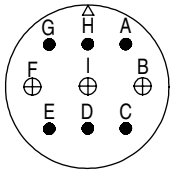


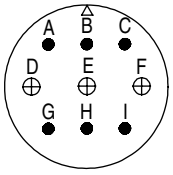
Table 5.3 Motor 3-Phase Power Cable Specifications – Large Capacity (CSMD/H/K/S, RSMS/D/H/F/K/L)

CON.A	CON.B	Color	Type
1	U	Red	3-Core Cable
2	V	White	3-Core Cable
3	W	Black	3-Core Cable
4	FG	Yellow stripes on green background FG Wire	Solder the shield of 3-core cable

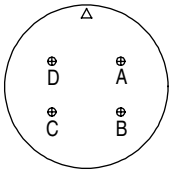
Large Capacity Motor Power Cannon Plug Specifications



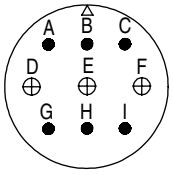
MS3102A 20-18P



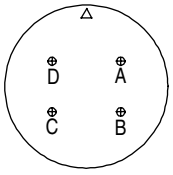
MS3102A 24-11P



MS3102A 20-4P
MS3102A 22-22P



MS3102A 32-17P
(for power)



MS3102A 14S-2P
(for brake)

Table 5.4 Large Capacity Motor Power Cannon Plug Specifications

Motor	Cable Brake Present/Absent	Pin	Function
CSMS-10 to 25 RSMS-10 to 25 CSMD-08 to 25 RSMD-08 to 25 CSMH-05 to 15 RSMH-05 to 15 RSMF-04 to 15 CSMK-03 to 09 RSMK-03 to 09 RSML-03 to 09	MS3102A 20-18P Valid	G	BR
		H	BR
		A	
		F	U
		I	V
		B	W
		E	FG
RSMF-04 to 15	MS3102A 20-18P N/A	D	FG
		C	
CSMS-10 to 25 RSMS-10 to 25 CSMD-08 to 25 RSMD-08 to 25 CSMH-05 to 15 RSMH-05 to 15 CSMK-03 to 09 RSMK-03 to 09 RSML-03 to 09	MS3102A 20-4P N/A	A	U
		B	V
		C	W
		D	FG
CSMS-30 to 50 RSMS-30 to 50 CSMD-30 to 50 RSMD-30 to 50 CSMH-20 to 50 RSMH-20 to 50 RSMF-25 to 45 CSMK-12 to 45 RSMK-12 to 45 RSML-12 to 45	MS3102A 24-11P Valid	A	BR
		B	BR
		C	
		D	U
		E	V
		F	W
		G	FG
RSMF-25 to 45	MS3102A 24-11P N/A	H	FG
		I	
CSMS-30 to 50 RSMS-30 to 50 CSMD-30 to 50 RSMD-30 to 50 CSMH-20 to 50 RSMH-20 to 50 CSMK-12 to 45 RSMK-12 to 45 RSML-12 to 45	MS3102A 22-22P N/A	A	U
		B	V
		C	W
		D	FG
CSMK-60 RSMK-60 RSML-60	MS3102A 32-17P (for power) N/A	A	U
		B	V
		C	W
		D	FG
		E	
		F	
		G	
		H	
		I	

Table 5.4 Large Capacity Motor Power Cannon Plug Specifications

Motor	Cable Brake Present/Absent	Pin	Function
CSMK-60 RSMK-60 RSML-60	MS3102A 14S-2P (for brake) Available	A	BR
		B	BR
		C	
		D	

Motor 3-Phase Power Cable Order Code

Enter the following order code to buy motor 3-phase power cable.

Table 5.5 Motor 3-Phase Power Cable Order Code

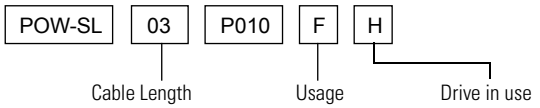
<table>
<tr><th>Motor</th><th>Power Cable</th></tr>
<tr><td>CSM
CSMT
CSMR
CSMQ
CSMZ
RSMQ
RSMZ</td><td>


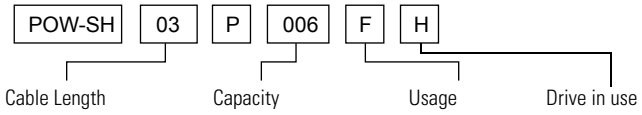
표 5.6
<table>
<tr><th>Symbol</th><th>Length</th></tr>
<tr><td>03</td><td>3m</td></tr>
<tr><td>05</td><td>5m</td></tr>
<tr><td>10</td><td>10m</td></tr>
<tr><td>15</td><td>15m</td></tr>
<tr><td>20</td><td>20m</td></tr>
</table>
표 5.6
<table>
<tr><th>Symbol</th><th>Type</th></tr>
<tr><td>F</td><td>Fixed</td></tr>
</table>
표 5.6
<table>
<tr><th>Symbol</th><th>Type</th></tr>
<tr><td>H</td><td>CSD3</td></tr>
<tr><td>A</td><td>CSDJ, CSDP</td></tr>
<tr><td>M</td><td>CSDM(1)</td></tr>
</table>
(1) Max. cable length is 15m. Factory default is 3m or 5m.
</td></tr>
<tr><td>CSMD
CSMS
CSMH
CSMK
RSMS
RSMD
RSMH
RSMF
RSMK
RSML</td><td>


표 5.7
<table>
<tr><th>Symbol</th><th>Length</th></tr>
<tr><td>03</td><td>3m</td></tr>
<tr><td>05</td><td>5m</td></tr>
<tr><td>10</td><td>10m</td></tr>
<tr><td>15</td><td>15m</td></tr>
<tr><td>20</td><td>20m</td></tr>
</table>
표 5.7
<table>
<tr><th>Symbol</th><th>Capacity</th></tr>
<tr><td>015</td><td>1.5 kW or less</td></tr>
<tr><td>035</td><td>3.5 kW or less</td></tr>
<tr><td>050</td><td>5 kW or less (1)</td></tr>
</table>
(1) Only 015 is available for CSDM.
표 5.7
<table>
<tr><th>Symbol</th><th>Type</th></tr>
<tr><td>F</td><td>Fixed</td></tr>
</table>
표 5.7
<table>
<tr><th>Symbol</th><th>Type</th></tr>
<tr><td>H</td><td>CSD3</td></tr>
<tr><td>A</td><td>CSDJ, CSDP</td></tr>
<tr><td>M</td><td>CSDM(1)</td></tr>
</table>
(1) Max. cable length is 15m. Factory default is 3m or 5m.
</td></tr>
</table>

Encoder Cable

Encoder Cable Specifications

Small capacity (CSM, CSMT/R/Q/Z, RSMQ/Z)

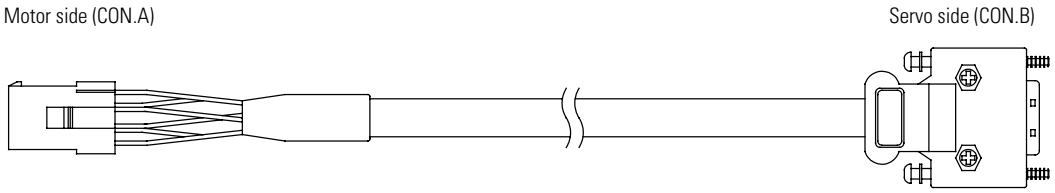


Table 5.8 CSM series 9-wire Inc. Encoder Cable: CSM, CSMT, CSMR

CON.A	CON.B	Color	Function	
1	3	1P (White/Blue)-Blue	A	Twisted Pair
2	4	1P (White/Blue)-White	A	
3	5	2P (White/Yellow)-Yellow	B	Twisted Pair
4	6	2P (White/Yellow)-White	B	
5	7	3P (White/Green)-Green	C	Twisted Pair
6	8	3P (White/Green)-White	C	
7	20	4P (White/Red)-Red	VCC	Twisted Pair
8	1	4P (White/Red)-White	GND	
9	GND Plate	Shield	FG	-

Table 5.9 RSM series 9-wire Inc. Encoder Cable : RSMQ, RSMZ

CON.A	CON.B	Color	Function	
1	3	1P (White/Blue)-Blue	A	Twisted Pair
2	4	1P (White/Blue)-White	A	
3	5	2P (White/Yellow)-Yellow	B	Twisted Pair
4	6	2P (White/Yellow)-White	B	
5	7	3P (White/Green)-Green	C	Twisted Pair
6	8	3P (White/Green)-White	C	
7	20	4P (White/Red)-Red	VCC	Twisted Pair
8	1	4P (White/Red)-White	GND	
9	GND Plate	Shield	FG	-

Note: RSMQ and RSMZ series motors are 3-wire type and use 12 Pin connector.

Table 5.10 Serial Encoder

CON.A	CON.B	Color	Function	
1	18	1P (White/Blue)-Blue	BAT+	Twisted Pair
2	19	1P (White/Blue)-White	BAT-	
3	GND Plate	Shield	FG	
4	10	2P (White/Yellow)-Yellow	SD+	Twisted Pair
5	13	3P (White/Yellow)-Yellow	SD-	
7	20	4P (White/Red)-Red	VCC	Twisted Pair
8	1	4P (White/Red)-White	GND	

Table 5.11 CSM Series 9-wire type connector specifications

Item	Housing	Specifications	Manufacturer	Amount
CON. A	Connector	172161-1	AMP	1 EA
	Terminal	170361-1(or 170365-1)		9 EA

Table 5.12 RSM Series 9-wire type connector specifications

Item	Housing	Specifications	Manufacturer	Amount
CON. A	Connector	172162-1	AMP	1 EA
	Terminal	170361-1 (or 170365-1)		9 EA

Table 5.13 17 Bit Serial connector specifications

Item	Housing	Specifications	Manufacturer	Amount
CON. B	Connector	10120-3000VE	AMP	1 EA
	Terminal	10320-52F0-008		1 EA

Large Capacity (CSMD/H/K/S, RSMS/D/H/F/K/L)

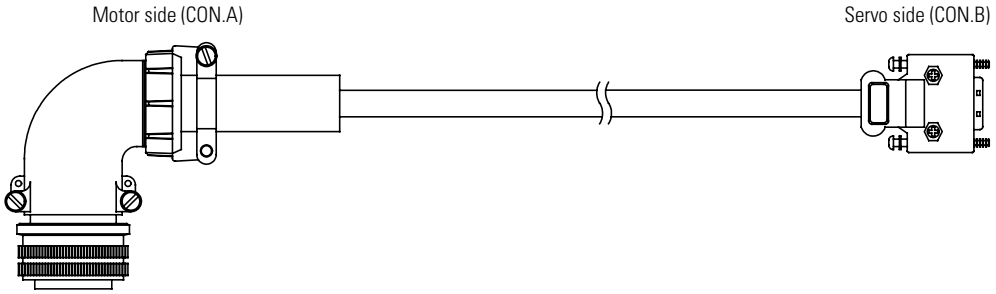


Table 5.14 15-Wire Inc. Encoder Cable

CON.A	CON.B	Color	Function	
A	3	1P (White/Blue)-Blue	A	Twisted Pair
B	4	1P (White/Blue)-White	A	
C	5	2P (White/Yellow)-Yellow	B	Twisted Pair
D	6	2P (White/Yellow)-White	B	
E	7	3P (White/Green)-Green	C	Twisted Pair
F	8	3P (White/Green)-White	C	
G	1	4P (White/Red)-Red	GND	Twisted Pair
H	20	4P (White/Red)-White	VCC	
J	GND Plate	Shield	FG	
K	10	5P (White/Purple)-Purple	U	Twisted Pair
L	13	5P (White/Purple)-White	U	
M	14	6P (Brown/Blue)-Blue	V	Twisted Pair
N	15	6P (Brown/Blue)-Brown	V	
P	16	7P (Brown/Yellow)-Yellow	W	Twisted Pair
R	17	7P (Brown/Yellow)-Brown	W	

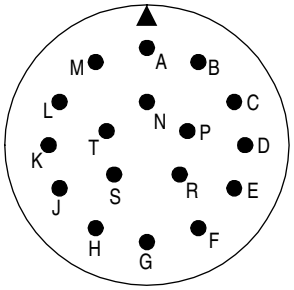
Table 5.15 17-Bit Abs./Inc Encoder Cable

CON.A	CON.B	Color	Function	
G	1	4P (White/Red)- White	GND	Twisted Pair
H	20	4P (White/Red)-Red	VCC	
J	GND Plate	Shield	FG	
K	10	5P (White/Purple) - Purple	SD	Twisted Pair
L	13	5P (White/Purple) - White	/SD	
S	19	7P (Brown/Yellow)- Yellow	BAT-	Twisted Pair
T	18	7P (Brown/Yellow) - Brown	BAT+	

Table 5.16 RSM Series 9-wire

CON.A	CON.B	Color	Function	
A	3	1P (White/Blue)-Bule	A	Twisted Pair
B	4	1P (White/Bule)-White	$\overline{A}$	
C	5	2P (White/Yellow)-Yellow	B	Twisted Pair
D	6	2P (White/Yellow)-White	$\overline{B}$	
E	7	3P (White/Green)-Green	C	Twisted Pair
F	8	3P (White/Green)-White	$\overline{C}$	
H	20	4P (White/Red)-Red	VCC	Twisted Pair
G	1	4P (White/Red)-White	GND	
J	GND Plate	Shield	FG	-

Large Capacity Motor Encoder Cannon Plug Specifications



MS3102A 20 to 29P

Encoder Cable Order Code

To order encoder cables, use the order code as shown below.

Table 5.17 Encoder Cable Order Code

<table>
<tr><th>Motor</th><th>Encoder cable</th></tr>
<tr><td>CSM
CSMT
CSMR
CSMQ
CSMZ
RSMQ
RSMZ</td><td>
ENC-SL | 03 | E | CL | S | F | A
Cable Length | Encoder Type | Usage
<table>
<tr><th>Symbol</th><th>Length</th></tr>
<tr><td>03</td><td>3m</td></tr>
<tr><td>05</td><td>5m</td></tr>
<tr><td>10</td><td>10m</td></tr>
<tr><td>15</td><td>15m</td></tr>
<tr><td>20</td><td>20m</td></tr>
</table>
<table>
<tr><th>Symbol</th><th>Types</th></tr>
<tr><td>CH</td><td>17-bit serial</td></tr>
<tr><td>CK</td><td>9-wire Inc /For user only in RSM series</td></tr>
<tr><td>CN</td><td>9-wire Inc /For user only in CSM series</td></tr>
<tr><td>CM</td><td>17-bit Serial with(1) Battery</td></tr>
</table>
<table>
<tr><th>Symbol</th><th>Type</th></tr>
<tr><td>F</td><td>Fixed</td></tr>
</table>
(1) -For user only in CSDM series
- Max. cable length is 15m. /Factory default is 3m or 5m.
</td></tr>
<tr><td>CSMD
CSMS
CSMH
CSMK
RSMS
RSMD
RSMH
RSMF
RSMK
RSML</td><td>
ENC-SH | 03 | E | CN | L | F | A
Cable Length | Encoder Typ | Usage
<table>
<tr><th>Symbol</th><th>Length</th></tr>
<tr><td>03</td><td>3m</td></tr>
<tr><td>05</td><td>5m</td></tr>
<tr><td>10</td><td>10m</td></tr>
<tr><td>15</td><td>15m</td></tr>
<tr><td>20</td><td>20m</td></tr>
</table>
<table>
<tr><th>Symbol</th><th>Types</th></tr>
<tr><td>CH</td><td>17-bit serial</td></tr>
<tr><td>CK</td><td>9-wire Inc / RSM Only</td></tr>
<tr><td>SN</td><td>15-wire Inc (1) /CSM Only</td></tr>
<tr><td>CM</td><td>17-bit Serial(2) with Battery</td></tr>
</table>
<table>
<tr><th>Symbol</th><th>Type</th></tr>
<tr><td>F</td><td>Fixed</td></tr>
<tr><td>M</td><td>Movable(1)</td></tr>
</table>
(1) Movable type is not available for CSDM.

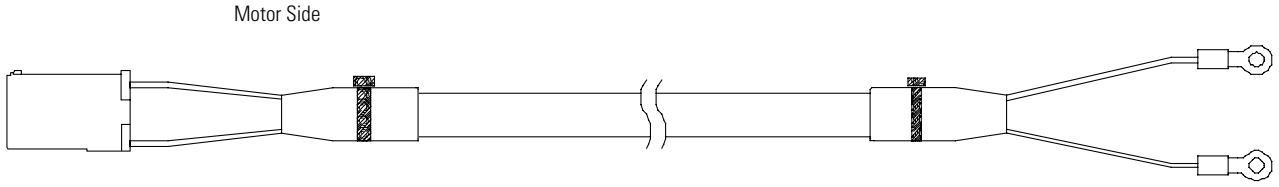
(1) CMDM does not support 15-wire rotary motor. CSDM supports only linear motor (15-wire), and a user is responsible for the cable

(2) -For user only in CSDM series
- Max. cable length is 15m. /Factory default is 3m or 5m.
</td></tr>
</table>

Motor Brake Cable

Motor Brake Cable Specifications

Small Capacity (CSM, CSMT/R/Q/Z, RSMQ/Z)



Large Capacity (CSMD/H/K/S, RSMS/D/H/F/K/L)

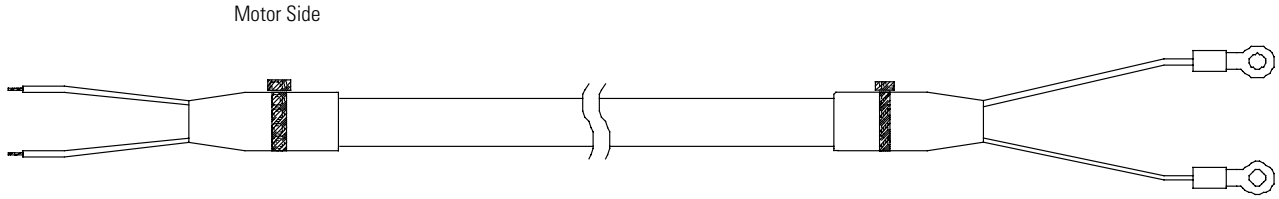


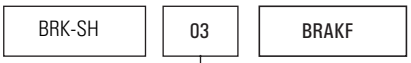
Table 5.18 Motor Brake Cable Specifications

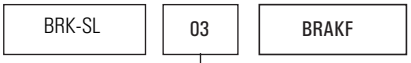
Indicator	Color
BK+	White of 2-Core Cable
BK-	Black of 2-Core Cable

Table 5.19 Connector Specifications

Item	Description	Specifications	Manufacturer	Amount
CON. A	Housing	172233-1	AMP	1 EA
	Terminal	170362-1 (or 170366-1)	AMP	2 EA

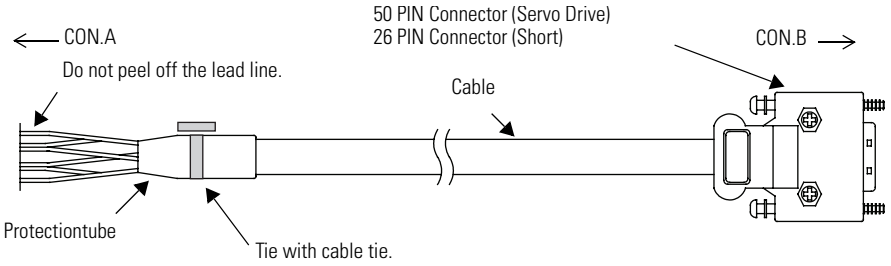
Table 5.20 Brake Cable Order Code

<table>
<tr><th>Motor</th><th>Brake cable</th></tr>
<tr><td>CSMD
CSMS
CSMH
CSMK
RSMS
RSMD
RSMH
RSMF
RSMK
RSML</td><td>


Cable length
<table>
<tr><th>Symbol</th><th>Length</th></tr>
<tr><td>03</td><td>3m</td></tr>
<tr><td>05</td><td>5m</td></tr>
<tr><td>10</td><td>10m</td></tr>
<tr><td>15</td><td>15m</td></tr>
<tr><td>20</td><td>20m</td></tr>
</table>
</td></tr>
<tr><td>CSM
CSMT
CSMR
CSMQ
CSMZ
RSMQ
RSMZ</td><td>


Cable length
<table>
<tr><th>Symbol</th><th>Length</th></tr>
<tr><td>03</td><td>3m</td></tr>
<tr><td>05</td><td>5m</td></tr>
<tr><td>10</td><td>10m</td></tr>
<tr><td>15</td><td>15m</td></tr>
<tr><td>20</td><td>20m</td></tr>
</table>
</td></tr>
</table>

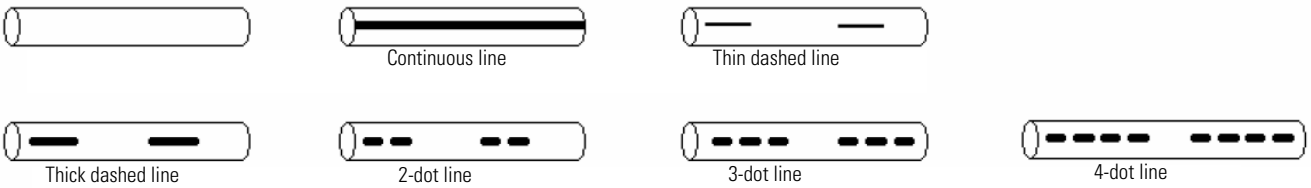
User I/O Cable



50-pin I/O Cable Connection

Table 5.21 50-pin I/O Cable Connection Specifications (Servo Drive)

CON.B	Wire Color	CON.B	Wire Color	CON.B	Wire Color
1	Red	21	Gray/Two-dot line	41	Orange/Continuous Line
2	Yellow	22	Red/3-dot line	42	Gray/Continuous Line
3	Skyblue	23	Yellow/3-dot line	43	Red/Thin-dashed
4	White	24	Skyblue/3-dot line	44	Yellow/Thin-dashed line
5	Pink	25	White/3-dot line	45	Skyblue/Thin-dashed line
6	Orange	26	Pink/3-dot line	46	White/Thin-dashed line
7	Gray	27	Orange/3-dot line	47	Pink/Thin-dashed line
8	Red/Thick dashed	28	Gray/3-dot line	48	Orange/Thin-dashed line
9	Yellow/Thick dashed	29	Red/4-dot line	49	Gray/Thin-dashed line
10	Skyblue/Thick dashed	30	Yellow/4-dot line	50	Shield (Green)
11	White/Thick dashed	31	Sky blue/4-dot line		
12	Pink/Thick dashed	32	White/4-dot line		
13	Orange/Thick dashed	33	Pink/4-dot line		
14	Gray/Thick dashed	34	Orange/4-dot line		
15	Red/Two-dot line	35	Gray/4-dot line		
16	Yellow/Two-dot line	36	Red/Continuous Line		
17	Skyblue/Two-dot line	37	Yellow/Continuous Line		
18	White/Two-dot line	38	Skyblue/Continuous Line		
19	Pink/Two-dot line	39	White/Continuous Line		
20	Orange/Two-dot line	40	Pink/Continuous Line		



26-pin I/O Cable Connection

Table 5.22 26-pin I/O Cable Connection Specifications (Servo Drive)

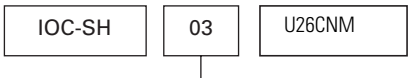
CON.B	Wire Color	CON.B	Wire Color
1	N.C	15	N.C
2	N.C	16	1P (White/Blue)-White
3	1P (White/Blue)-White	17	2P (White/Yellow)-Yellow
4	2P (White/Yellow)-White	18	3P (White/Red)-White
5	3P (White/Green)-White	19	5P (White/Violet)-Violet
6	5P (White/Violet)-White	20	6P (Brown/Blue)-Blue
7	6P (Brown/Blue)-Brown	21	7P (White/Yellow)-Yellow
8	7P (Brown/Yellow)-Brown	22	8P (Brown/Green)-Green
9	8P (Brown/Green)-Brown	23	10P (Brown/Violet)-Brown
10	9P (Brown/Red)-Brown	24	11P(Black/Blue)-Blue
11	11P(Black/Blue)-Black	25	12P (Black/Yellow)-Yellow
12	12P (Black/Yellow)-Black	26	13P (Black/Green)-Green
13	13P (Black/Green)-Black	GND Plage	Shield
14	N.C		

Table 5.23 Connector Specifications

Item	Description	Specifications	Manufacturer	Amount
CON. B	Connector	10150-3000VE	3M	1 EA
	Case	10350-52A0-008	3M	1 EA

Table 5.24 User I/O Cable Order Code

User I/O cable



Cable length

Symbol	Length
03	3 m
05	5 m

Drive in Use

Symbol	Length
U26CNM	CSDM
U50CNA	CSD3 CSDJ CSDP

Communication Cable

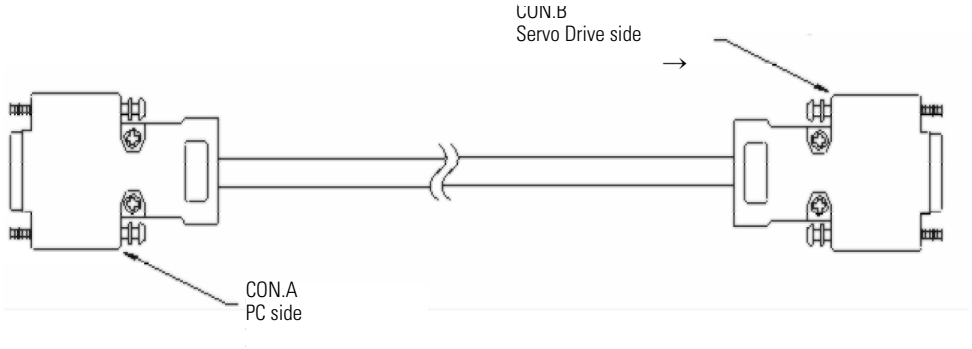


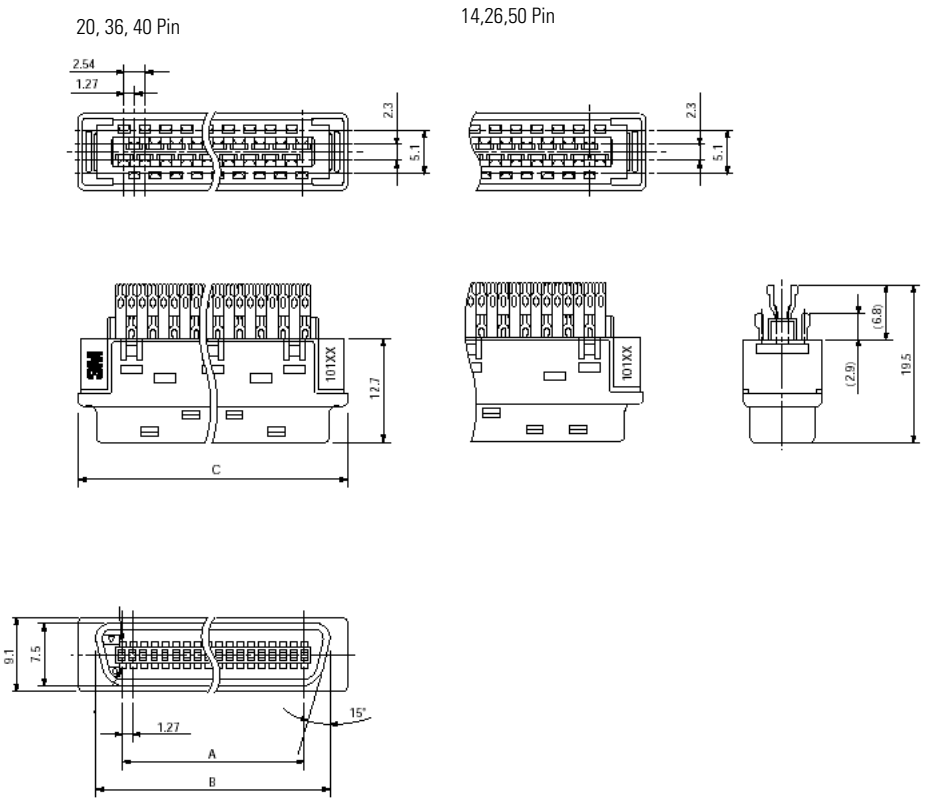
Table 5.25 Communication Cable (CON.A↔ CON.B) Connection Specifications

CON.A	CON.B	Wire color	Function
5	5	Gray	OFF_CHK
3	2	Brown	RX
2	3	Red	TX
N.C	9	Shield	P.E

Table 5.26 Connector Specifications

Item	Description	Specifications	Manufacturer	Amount
CON. A	Connector	17JE-13090-02 (DI) Socket Type	DDK	1 EA
CON. B	Connector	10120-3000VE	3M	1 EA
	Case	10320-52F0-008	3M	1 EA

Controller Cable Connector Specifications



Pin	Product number	A	B	C
14	10114-3000PE	7.62	13.6	18.2
20	10120-3000PE	11.43	17.6	22.0
26	10126-3000PE	15.24	21.5	25.8
36	10136-3000PE	21.59	27.8	32.2
40	10140-3000PE	24.13	30.3	34.7
50	10150-3000PE	30.48	36.7	41.1

Order Number

- 20 PIN: CON20PA_ENC
- 50 PIN: CON50PA_IOC

SERCOS Cables

The specifications of SERCOS cables for CSDM SERCOS ring are shown below. The max. length is 32m.

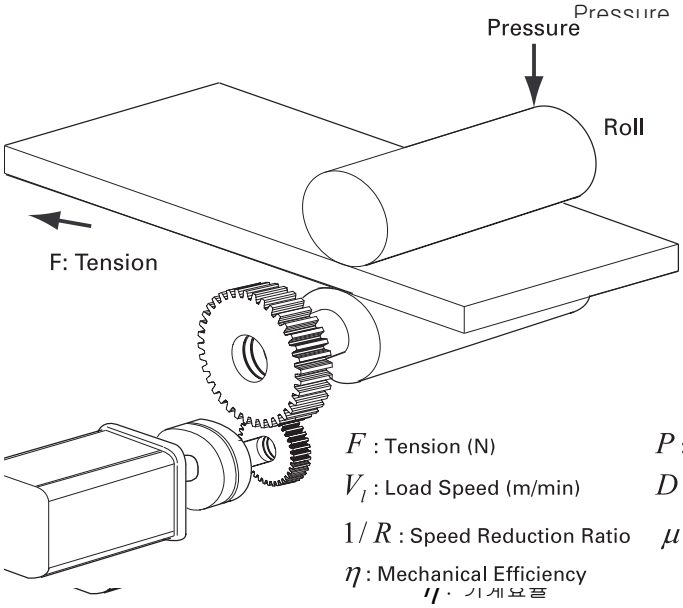
Table 5.27 SERCOS Cable Order Code

Indoor Use (Diameter 2.2mm)	**Outdoor Use (Diameter: 3.6mm, 5mm)**	**Length (m)**
SCS_SEA1PFOCNM	SCS_SVA1PFOCNM	0.1
SCS_SEA2PFOCNM	SCS_SVA2PFOCNM	0.2
SCS_SEA3PFOCNM	SCS_SVA3PFOCNM	0.3
SCS_SE01PFOCNM	SCS_SV01PFOCNM	1
SCS_SE03PFOCNM	SCS_SV03PFOCNM	3
SCS_SE05PFOCNM	SCS_SV05PFOCNM	5
SCS_SE08PFOCNM	SCS_SV08PFOCNM	8
SCS_SE10PFOCNM	SCS_SV10PFOCNM	10
SCS_SE15PFOCNM	SCS_SV15PFOCNM	15
SCS_SE20PFOCNM	SCS_SV20PFOCNM	20
SCS_SE25PFOCNM	SCS_SV25PFOCNM	25
SCS_SE32PFOCNM	SCS_SV32PFOCNM	32
SCS_SEA1PFOCNM	SCS_SVA1PFOCNM	0.1
SCS_SEA2PFOCNM	SCS_SVA2PFOCNM	0.2
SCS_SEA3PFOCNM	SCS_SVA3PFOCNM	0.3
SCS_SE01PFOCNM	SCS_SV01PFOCNM	1
SCS_SE03PFOCNM	SCS_SV03PFOCNM	3
SCS_SE05PFOCNM	SCS_SV05PFOCNM	5
SCS_SE08PFOCNM	SCS_SV08PFOCNM	8
SCS_SE10PFOCNM	SCS_SV10PFOCNM	10
SCS_SE15PFOCNM	SCS_SV15PFOCNM	15
SCS_SE20PFOCNM	SCS_SV20PFOCNM	20

Load Calculation

Roll Load

Mechanical Configuration



F : Tension (N)
P : Pressure
V_l : Load Speed (m/min)
D : Roll Diameter (m)
$1/R$: Speed Reduction Ratio
μ : Friction Coefficient
η : Mechanical Efficiency

Movement Amount (M)

$$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$$

$$if \quad t_a = t_d, \quad L_s = \frac{V_l}{60} \times (t_s - t_a)$$

Motor Shaft Revolving Speed (r/min)

$$N_M = \frac{RV_l}{\pi D}$$

Load Torque (N· m)

$$T_L = \frac{(\mu P + F)D}{2R\eta}$$

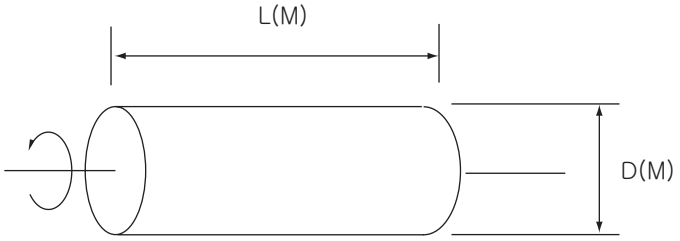
Load Inertia Moment (Kg· m^2)

$$J_L = J_G + \frac{J_R}{R^2}$$

J_R : Roll Inertia J_G : Gear, Coupling Inertia

J_R

< Hollow Cylinder >



$$J_R = \frac{M(D_o^2 - D_i^2)}{8} = \frac{\pi\rho L(D_o^4 - D_i^4)}{32}$$

Minimum Acceleration Time (s)

$$t_{am} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} - T_L)}$$

J_M : Motor Inertia, T_{PM} : Motor Maximum Torque

Minimum Deceleration Time (s)

$$t_{dm} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} + T_L)}$$

Load Operation Power (W)

$$P_o = \frac{2\pi N_M T_L}{60}$$

Load Acceleration Power (W)

$$P_a = (\frac{2\pi N_M}{60})^2 \times \frac{J_L}{t_a}, \ (t_a \le t_{am})$$

Acceleration Torque Required (N· m)

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L, \ (t_a \le t_{am})$$

Deceleration Torque Required (N· m)

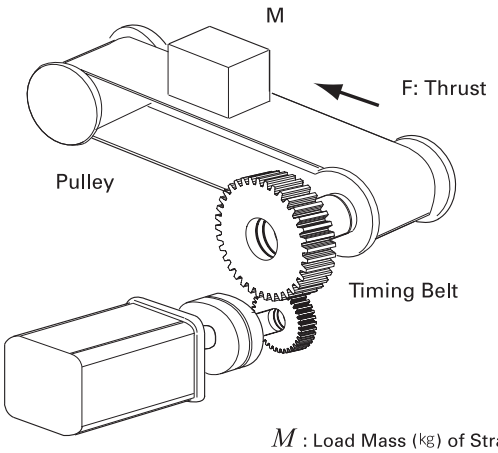
$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_d} - T_L, \ (t_a \le t_{dm})$$

Torque Effective Value (N· m)

$$T_{rms} = \sqrt{\frac{T_p^2 t_a + T_L^2 (t_s - t_a - t_d) + T_s^2 t_d}{t_c}}$$

Timing Belt Load

Mechanical Configuration



M : Load Mass (kg) of Straight Movement Part
F : Thrust (N)
V_l : Load Speed (m/min)
D : Pulley (m)
$1/R$: Speed Reduction Ratio
μ : Friction Coefficient
η : Mechanical Efficiency

Movement Amount (m)

$$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$$

$$if \quad t_a = t_d, \quad L_s = \frac{V_l}{60} \times (t_s - t_a)$$

Motor Shaft Revolving Speed (r/min)

$$N_M = \frac{RV_l}{\pi D}$$

Load Torque (N· m)

$$T_L = \frac{(9.8\mu M + F)D}{2R\eta}$$

Load Inertia Moment (kg· m^2)

$$J_L = J_W + J_G + \frac{J_P}{R^2}$$

J_W: Load Inertia of Straight Movement Part J_P: Inertia of Pulley Part

J_G: Gear, Coupling Inertia

$$J_W = M(\frac{D}{2R})^2$$

Minimum Acceleration Time (s)

$$t_{am} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} - T_L)}$$

J_M: Motor Inertia T_{PM}: Motor Maximum Torque

Minimum Deceleration Time(s)

$$t_{dm} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} + T_L)}$$

Load Operation Power (W)

$$P_o = \frac{2\pi N_M T_L}{60}$$

Load Acceleration Power (W)

$$P_a = (\frac{2\pi N_M}{60})^2 \times \frac{J_L}{t_a}, \ (t_a \le t_{am})$$

Acceleration Torque Required (N· m)

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L, \ (t_a \le t_{am})$$

Deceleration Torque Required (N· m)

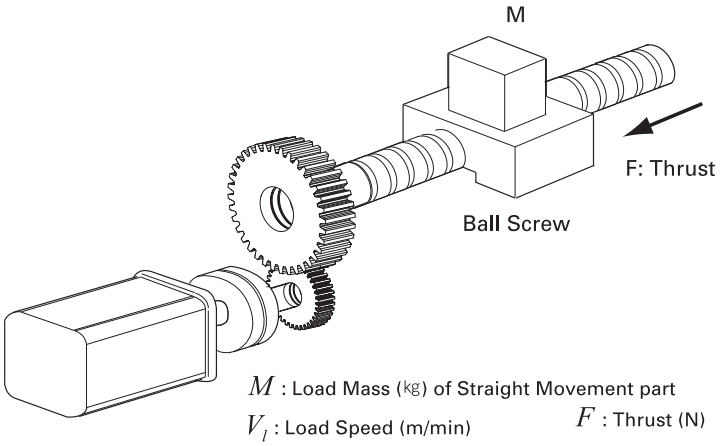
$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_d} - T_L, \ (t_a \le t_{dm})$$

Torque Effective Value (N· m)

$$T_{rms} = \sqrt{\frac{T_p^2 t_a + T_L^2 (t_s - t_a - t_d) + T_s^2 t_d}{t_c}}$$

Horizontal Ball Screw Load

Machine Configuration



M : Load Mass (㎏) of Straight Movement part

V_l : Load Speed (m/min)

P_B : Ball Screw Lea

L_B : Ball Screw Length (m)

η : Mechanical Efficiency

F : Thrust (N)

D_B : Ball Screw

$1/R$: Speed Reduction Ratio

μ : Friction Coefficient

Movement Amount (m)

$$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$$

$$if \quad t_a = t_d, \quad L_s = \frac{V_l}{60} \times (t_s - t_a)$$

Motor Shaft Revolving Speed (r/min)

$$N_M = \frac{RV_l}{P_B}$$

Load Torque (N· m)

$$T_L = \frac{(9.8\mu M + F)P_B}{2\pi R\eta}$$

Load Inertia Moment (kg· m^2)

$$J_L = J_W + J_G + \frac{J_B}{R^2}$$

J_W : Load Inertia of Straight Movement Part J_B : Ball Screw Inertia

J_G : Gear, Coupling Inertia

$$J_W = M(\frac{P_B}{2\pi R})^2, \quad J_B = \frac{M_B D_B{}^2}{8} = \frac{\pi\rho L_B D_B{}^4}{32}$$

M_B : Ball Screw Mass[kg]

$\rho = 7.87 \times 10^3$ [kg/㎥] ; Iron

$\rho = 2.70 \times 10^3$ [kg/㎥] ; Aluminum

Minimum Acceleration Time(s)

$$t_{am} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} - T_L)}$$

J_M : Motor Inertia, T_{PM} : Motor Maximum Torque

Minimum Deceleration Time (s)

$$t_{dm} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} + T_L)}$$

Load Operation Power (W)

$$P_o = \frac{2\pi N_M T_L}{60}$$

Load Acceleration Power (W)

$$P_a = (\frac{2\pi N_M}{60})^2 \times \frac{J_L}{t_a}, \ (t_a \le t_{am})$$

Acceleration Torque Required (N· m)

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L, \ (t_a \le t_{am})$$

Deceleration Torque Required (N· m)

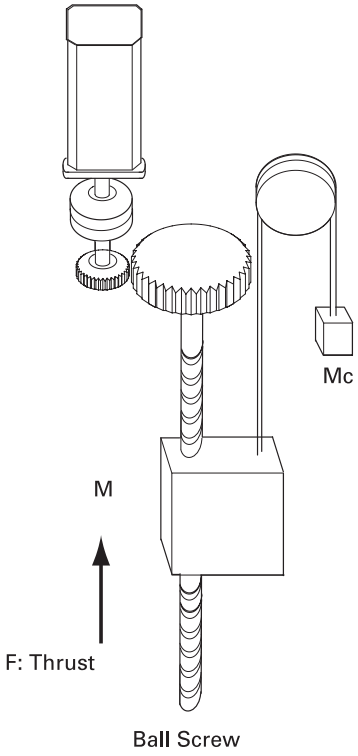
$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_d} - T_L, \ (t_a \le t_{dm})$$

Torque Effective Value (N· m)

$$T_{rms} = \sqrt{\frac{T_p^2 t_a + T_L^2 (t_s - t_a - t_d) + T_s^2 t_d}{t_c}}$$

Vertical Ball Screw Load

Mechanical Configuration



M : Load Mass (kg) of Straight Movement Pa

V_l : Load Speed (m/min)

P_B : Ball Screw Lead (m)

L_B : Ball Screw Length (m)

η : Mechanical Efficiency

F : Thrust (N)

D_B : Ball Screw Diameter (m) Ball Screw

$1/R$: Speed Reduction Ratio

μ : Friction Coefficient

M_C : Mass of Counter (kg)

Movement Amount (m)

$$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$$

$$if \quad t_a = t_d, \quad L_s = \frac{V_l}{60} \times (t_s - t_a)$$

Motor Shaft Revolving Speed (r/min)

$$N_M = \frac{RV_l}{P_B}$$

Load Torque (N· m)

$$T_L = \frac{\{9.8\mu(M - M_C) + F\}P_B}{2\pi R\eta}$$

Load Inertia Moment (kg· m^2)

$$J_L = J_W + J_G + \frac{J_B}{R^2}$$

J_W : Load Inertia of Straight Movement Part, J_B : Ball Screw Inertia

J_G : Gear, Coupling Inertia

$$J_W = (M + M_C)(\frac{P_B}{2\pi R})^2$$

$$J_B = \frac{M_B D_B{}^2}{8} = \frac{\pi\rho L_B D_B{}^4}{32}$$

M_B :Ball Screw Mass[kg]

$\rho = 7.87 \times 10^3$ [kg/㎥] : Iron

$\rho = 2.70 \times 10^3$ [kg/㎥] : Aluminum

Minimum Acceleration Time (s)

$$t_{am} = \frac{2\pi N_M(J_M + J_L)}{60(T_{PM} - T_L)}$$

J_M : Motor Inertia, T_{PM} : Motor Maximum Torque

Minimum Deceleration Time(s)

$$t_{dm} = \frac{2\pi N_M(J_M + J_L)}{60(T_{PM} + T_L)}$$

Load Operation Power (W)

$$P_o = \frac{2\pi N_M T_L}{60}$$

Load Acceleration Power (W)

$$P_a = (\frac{2\pi N_M}{60})^2 \times \frac{J_L}{t_a}, \ (t_a \le t_{am})$$

Acceleration Torque Required (N· m)

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L, \ (t_a \le t_{am})$$

Deceleration Torque Required (N· m)

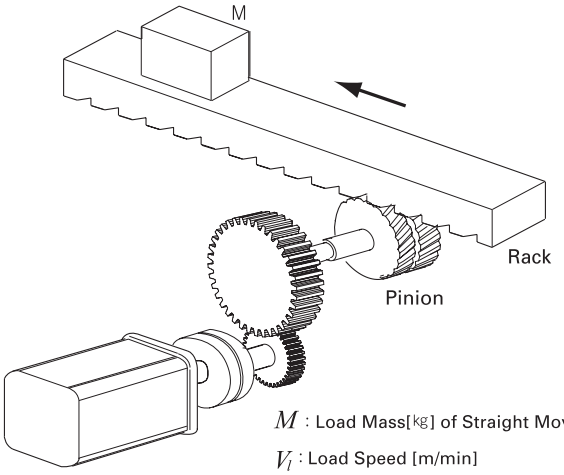
$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_d} - T_L, \ (t_a \le t_{dm})$$

Torque Effective Value (N· m)

$$T_{rms} = \sqrt{\frac{T_p^2 t_a + T_L^2 (t_s - t_a - t_d) + T_s^2 t_d}{t_c}}$$

Rack & Pinion Load

Mechanical Configuration



M : Load Mass[kg] of Straight Movement Part
F : Thrust [N]
V_l : Load Speed [m/min]
D : Pinion Diameter [m]
$\mathrm{l/R}$: Speed Reduction Ratio
t : Pinion Thickness [m]
η : Mechanical Efficiency
μ : Friction Coefficient

Movement Amount (m)

$$L_s = \frac{V_l}{60} \times \frac{2t_s - t_a - t_d}{2}$$

$$if \quad t_a = t_d, \quad L_s = \frac{V_l}{60} \times (t_s - t_a)$$

Motor Shaft Revolving Speed (r/min)

$$N_M = \frac{RV_l}{P_B}$$

Load Torque (N· m)

$$T_L = \frac{(9.8\mu M + F)D}{2R\eta}$$

Load Inertia Moment (kg· m^2)

$$J_L = J_W + J_G + \frac{J_P}{R^2}$$

J_W : Load Inertia of Straight Movement Part J_P : Pinion Inertia

J_G : Gear, Coupling Inertia

$$J_W = M(\frac{D}{2R})^2,\ J_P = \frac{M_p D^2}{8} = \frac{\pi \rho t D^4}{32}$$

M_P : Pinion Mass[kg]

$\rho = 7.87 \times 10^3$ [kg/㎥] : Iron

$\rho = 2.70 \times 10^3$ [kg/㎥] : Aluminum

Minimum Acceleration Time (s)

$$t_{am} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} - T_L)}$$

J_M : Motor Inertia T_{PM} : Motor Maximum Torque

Minimum Deceleration Time (s)

$$t_{dm} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} + T_L)}$$

Load Operation Power (W)

$$P_o = \frac{2\pi N_M T_L}{60}$$

Load Acceleration Power (W)

$$P_a = (\frac{2\pi N_M}{60})^2 \times \frac{J_L}{t_a},\ (t_a \le t_{am})$$

Acceleration Torque Required (N· m)

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L, \ (t_a \le t_{am})$$

Deceleration Torque Required (N· m)

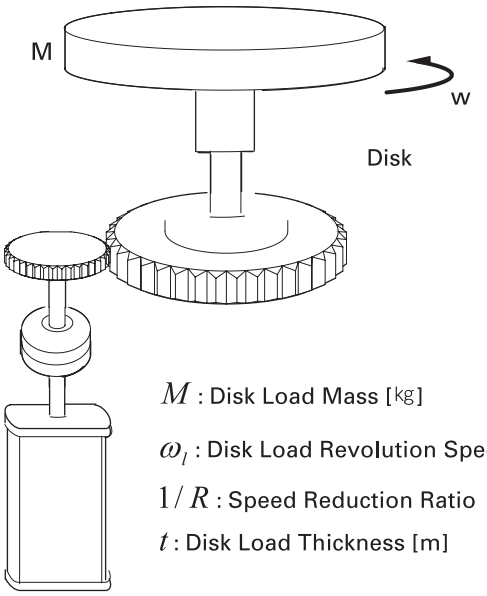
$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_d} - T_L, \ (t_a \le t_{dm})$$

Torque Effective Value (N· m)

$$T_{rms} = \sqrt{\frac{T_p^2 t_a + T_L^2 (t_s - t_a - t_d) + T_s^2 t_d}{t_c}}$$

Disk Load

Mechanical Configuration



M : Disk Load Mass [kg]

T_l : Load Torque

ω_l : Disk Load Revolution Speed [rpm]

D : Disk Load Diameter [m]

$1/R$: Speed Reduction Ratio

η : Mechanical Efficiency

t : Disk Load Thickness [m]

Movement Amount (rad)

$$\theta_s = \frac{\omega_l}{60} \times \frac{2t_s - t_a - t_d}{2}$$

$$if \quad t_a = t_d, \quad \theta_s = \frac{\omega_l}{60} \times (t_s - t_a)$$

Motor Shaft Revolving Speed (r/min)

$$N_M = R\omega_l$$

Load Torque (N· m)

$$T_L = \frac{T_l}{R}$$

Load Inertia Moment (kg· m^2)

$$J_L = J_G + \frac{J_W}{R^2}$$

J_W : Disk Load Inertia, J_G : Gear, Coupling Inertia

$$J_R = \frac{MD^2}{8} = \frac{\pi\rho t D^4}{32}$$

$\rho = 7.87 \times 10^3$ [kg/㎥] ; Iron

$\rho = 2.70 \times 10^3$ [kg/㎥] ; Aluminum

Minimum Acceleration Time(s)

$$t_{am} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} - T_L)}$$

J_M : Motor Inertia T_{PM} : Motor Maximum Torque

Minimum Deceleration Time(s)

$$t_{dm} = \frac{2\pi N_M (J_M + J_L)}{60(T_{PM} + T_L)}$$

Load Operation Power (W)

$$P_o = \frac{2\pi N_M T_L}{60}$$

Load Acceleration Power (W)

$$P_a = (\frac{2\pi N_M}{60})^2 \times \frac{J_L}{t_a},\ (t_a \le t_{am})$$

Acceleration Torque Required (N· m)

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L,\ (t_a \le t_{am})$$

Deceleration Torque Required (N· m)

$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_d} - T_L,\ (t_a \le t_{dm})$$

Torque Effective Value (N· m)

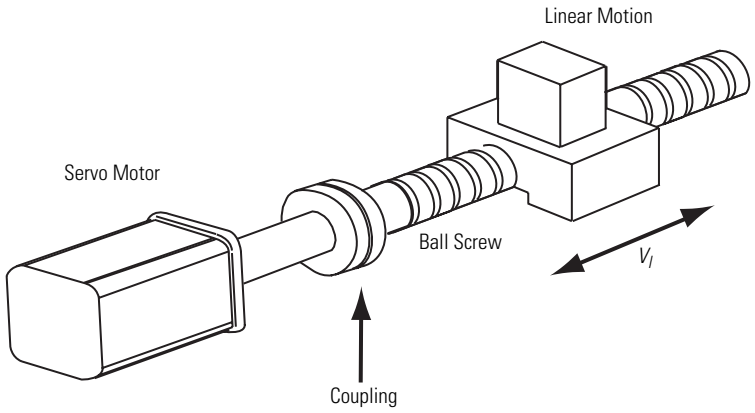
$$T_{rms} = \sqrt{\frac{T_p^2 t_a + T_L^2 (t_s - t_a - t_d) + T_s^2 t_d}{t_c}}$$

Motor Capacity Selection

This chapter describes the process of selecting a motor suitable for the work you want citing a horizontal ball screw load system as an example.

System Configuration

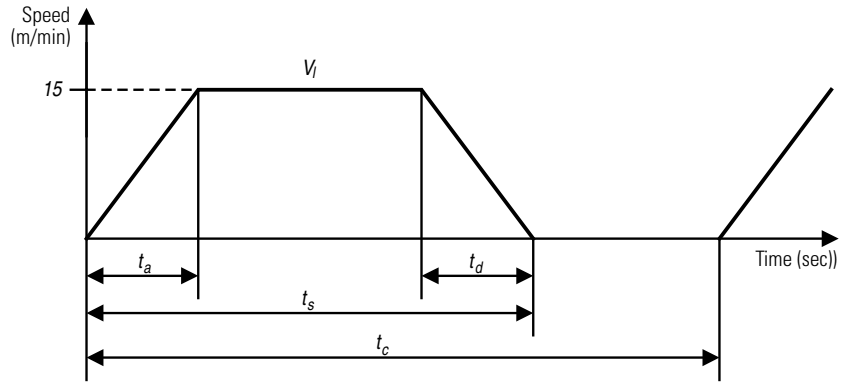
Horizontal Ball Screw Load System



System Configuration Condition Value

Item	Value
Load Velocity (V_l)	15 m/min
Load Mass on Linear Movement Part (M)	500 kg
Ball Screw Length(L_B)	1.4 m
Ball Screw Diameter(D_B)	0.04 m
Ball Screw Lead (P_B)	0.01 m
Coupling Mass (M_K)	1 kg
Coupling External Diameter (D_k)	0.06 m
Transfer Number (n)	40/min
Transfer Distance (λ)	0.275 m
Transfer Time (t_m)	1.2 sec. or less
Stiction Coefficient (μ)	0.2
Mechanical Efficiency (λ)	0.9

Speed Diagram



$$t = \frac{60}{n} = \frac{60}{40} = 1.5 \text{ sec}$$

Here $t_a = t_d$

$$t_a = t_m - \frac{60 \times \lambda}{V_l} = 1.2 - \frac{60 \times 0.275}{15} = 0.1 \text{ sec}$$

Servo Motor Selection Criteria Calculation and Review

Selection Criteria Calculation

Revolving Speed

Revolving Speed on Load Shaft $N_l = \frac{V_l}{P_B} = \frac{15}{0.01} = 1500$ r/min

As it is direct connection to coupling, decelerating rate is $1/R = 1$

therefore, $N_M = N_l \times R = 1500 \times 1 = 1500$ r/min

Load Torque

$$T_l = \frac{9.8 \mu M P_B}{2\pi R \eta} = \frac{9.8 \times 0.2 \times 500 \times 0.01}{2\pi \times 1 \times 0.9} = 1.73 \text{ N·m}$$

Load Inertia Moment

Linear Movement Part $J_{L1} = M\left(\frac{P_B}{2\pi R}\right)^2 = 500 \times \left(\frac{0.01}{2\pi \times 1}\right)^2 = 12.7 \times 10^{-4}$ kg·m²

Ball Screw

$J_B = \frac{\pi \rho L_B D_B^{\ 4}}{32} = \frac{\pi}{32} \times 7.87 \times 10^3 \times 1.4 \times 0.04^4 = 27.7 \times 10^{-4}$ kg·m²

Coupling $J_C = \frac{1}{8} \times M_C \times D_C^{\ 2} = \frac{1}{8} \times 0.06^2 = 4.5 \times 10^{-4}$ kg·m²

Load Inertia Moment on Motor Shaft $J_L = J_{L1} + J_G + J_C = 44.9 \times 10^{-4}$ kg·m²

Load Operation Power

$P_O = \frac{2\pi N_M T_L}{60} = \frac{2\pi \times 1500 \times 1.73}{60} = 272\text{W}$

Load Acceleration Power

$P_a = \left(\frac{2\pi N_M}{60}\right)^2 \times \frac{J_L}{t_a} = \left(\frac{2\pi \times 1500}{60}\right)^2 \times \frac{44.9 \times 10^{-4}}{0.1} = 1108\text{W}$

Tentative Selection of Servo Motor

When selecting a servo motor, the following conditions must be met.

- $J_L \leq$ Allowed Inertia Moment on Servo Drive
- Consumed Acceleration Torque = Instant Maximum Torque of Motor
- Consumed Deceleration Torque = Instant Maximum Torque of Motor
- T_{rms} = Rated Torque of Motor
- $P_o + P_a$ = (1 to 2) X Rated Output of Motor
- Motor Shaft Revolving Speed N_M = Rated Revolving Speed of Motor

Tentatively select a servo motor based on the conditions above. The motor specifications are as follows..

- Rated Output CSMD-1000(W)
- Rated Revolving Speed 2000 r/min
- Rated Torque 4.8 N·m
- Instant Maximum Torque 14.4 N·m
- Motor Shaft Inertia Moment: 6.17×10^{-4} kg·m^2
- Allowed Load Inertia Moment on Servo Drive: 61.7×10^{-4} kg·m^2

Review Selection Criteria of Tentatively Selected Servo Motor

1. Motor Side Load Inertia Moment J_L

   $J_L = 44.9 \times 10^{-4}$ kg·m^2 < Allowed Load Inertia Moment on Servo Drive: 61.7×10^{-4} kg·m^2

2. Required Starting Torque (Consumed Acceleration Torque T_P)

$$T_P = \frac{2\pi N_M (J_M + J_L)}{60 t_a} + T_L = \frac{2\pi \times 1500 \times (6.17 \times 44.9)}{60 \times 0.1} + 1.73$$

   = 9.75 N·m < Instant Maximum Torque of Motor

3. Require Stopping Torque(Consumed Deceleration Torque)

$$T_S = \frac{2\pi N_M (J_M + J_L)}{60 t_a} - T_L = \frac{2\pi \times 1500 \times (6.17 \times 44.9)}{60 \times 0.1} - 1.73$$

   = 6.29 N·m < Instant Maximum Torque of Motor

4. Effective Torque (average)

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

$$= \sqrt{\frac{9.75^2 \times 0.1 + 1.73^2 \times 10 + 6.29^2 \times 0.1}{1.5}}$$

= 3.31 N·m < Rated Torque of Motor

5. Power

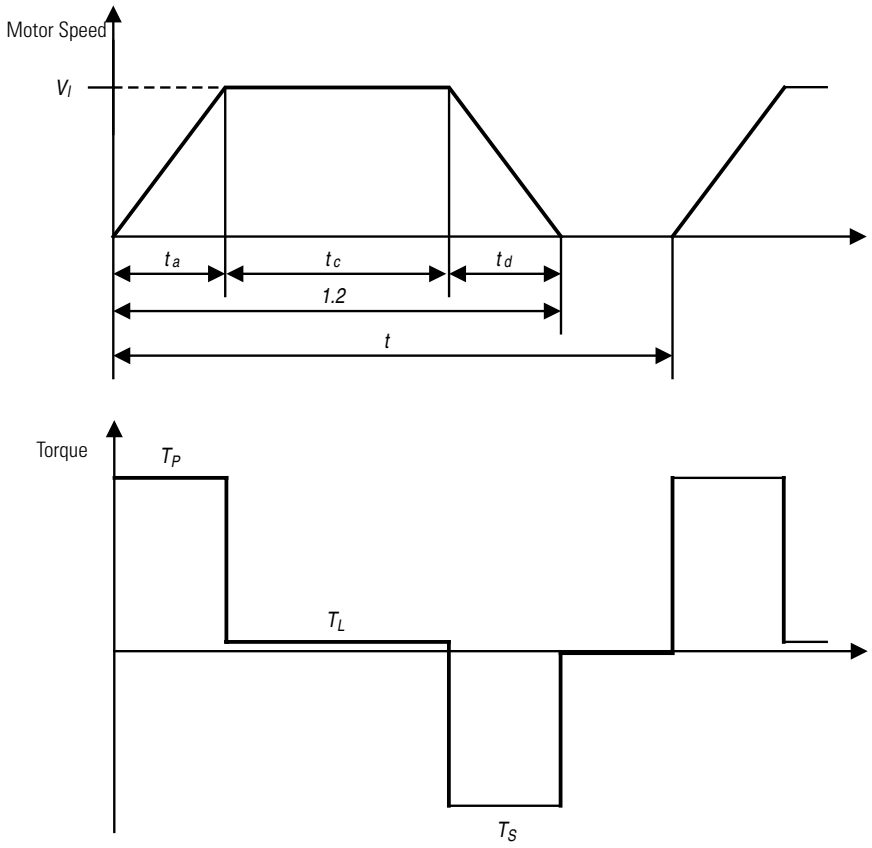
$P_a + P_o$ = 1108 + 272= 1380W < Motor Rated Output 1000W X (1 to 2)

6. Revolving Speed

N_M = 1500 rpm < 2000 rpm < Rated Revolving Seed of Motor 2000 rpm

Final Selection of Servo Motor

The tentatively selected servo motor should meet all criteria above to be used. Selected AC servo motor generates torque which is influenced by speed as presented below.


Motor Speed
V_l
t_a
t_c
t_d
1.2
t
Torque
T_P
T_L
T_S

Maintenance and Repair

This chapter describes how to check a servo motor, diagnose any of its malfunctions, and treat them.

Maintenance and Repair

Servo Motor Maintenance and Repair

AC servo motor is an assembly of mechanical components, without any abrasive part. Simple checking as follows is sufficient. Please choose when to check the system after considering the usage environment.

Table 8.1 Servo Motor Maintenance and Repair

Maintenance and Repair Item	Check Interval	Maintenance and Repair Method	Remarks
Vibration and Noise	Everyday	Use touch and hearing	Compared to normal times
Foreign substance	The moment they are found	Use a vacuum cleaner	
Insulation Resistance	1 Year	Measure with insulation resistance gauge 500V 10 MΩ or more is normal	Contact the local OEMax Distributor or sales representatives if it is lower than 10Ω after checking with insulation resistance measuring instrument.
Oil Seal	5000 Hours	Replace with a new oil seal.	Only for motor with oil seal
Comprehensive Checking	20000 hours (5 years)	Contact us	Replacement of degrading and abrasive components

ATTENTION

You cannot use after-sales service if you disassemble the servo motor at your discretion.

Servo Drive Maintenance and Repair

NOTE

As for maintenance and repair of a servo drive, refer to the user manual of the servo drive.

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Servo Motor User Manual

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