

Servo motors for high-speed, high-accuracy, linear drive systems



Sophisticated Performance

- Maximum speed: 3 m/s (LM-H3 series)
- Maximum thrust range: 150 N to 18000 N
Small size and high thrust are achieved by the increased winding density and the optimized core and magnet geometries as a result of electromagnetic field analysis.
- Four series are available: core, liquid-cooling core, magnetic attraction counter-force core, and coreless types.
- The linear servo motors are compatible with a variety of serial interface linear encoders including A/B/Z-phase differential output type linear encoders*. The linear encoder resolution ranges from 1 nm and up.
* A/B/Z-phase differential output type linear encoder is compatible with MR-J4-GF-RJ/MR-J4-B-RJ/MR-J4-A-RJ servo amplifier.
- High-performance systems such as high-accuracy tandem synchronous control are achieved using MR-J4 series servo amplifier with CC-Link IE Field Network or SSCNET III/H compatible controller.

Achieving High-performance Machine

For higher machine performance

- Improved productivity due to high-speed driving part.
- High-accuracy positioning by fully closed loop control system.

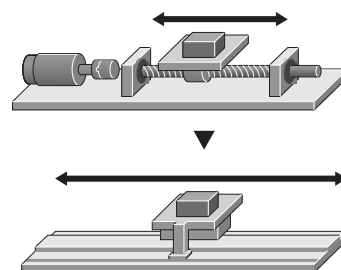
For easier use

- The linear servo motor enables simple and compact machine with high rigidity.
- Smooth operation and clean system are achieved.

For flexible machine configurations

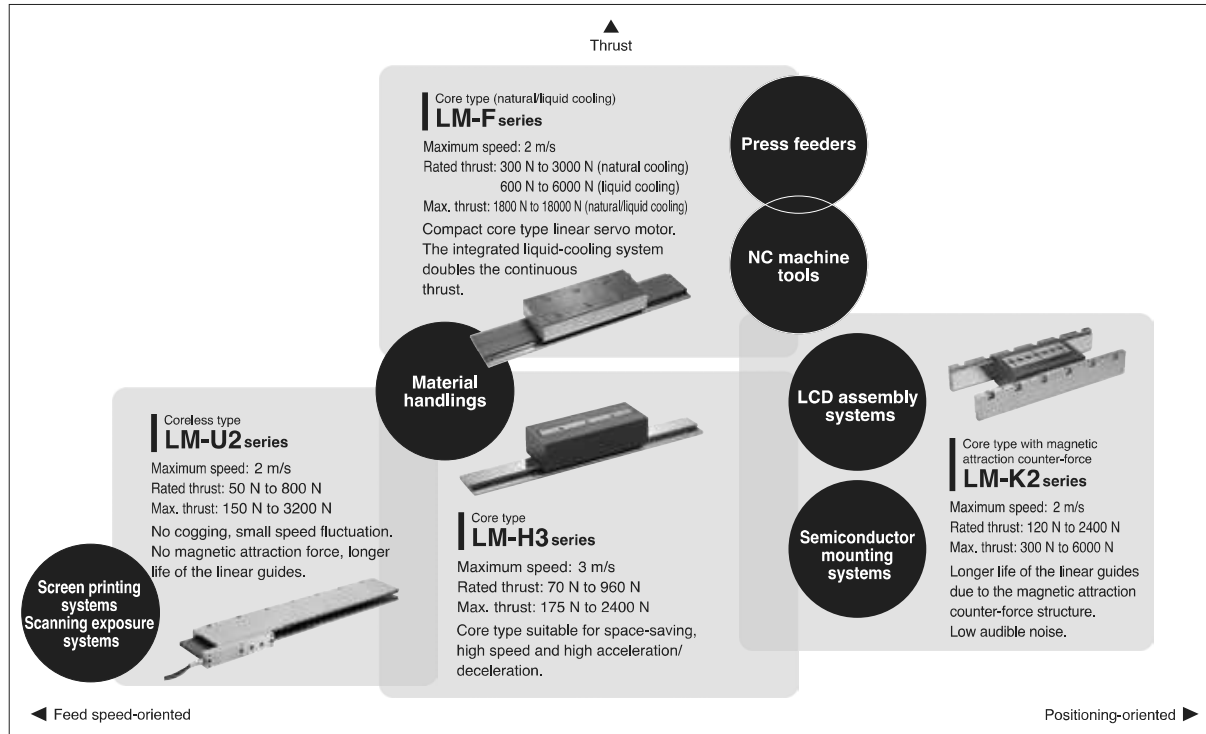
- Multi-head and tandem systems are easily configured.
- The linear servo motor is suitable for long-stroke applications.

[Offers more advantage than conventional ball screw driving systems]



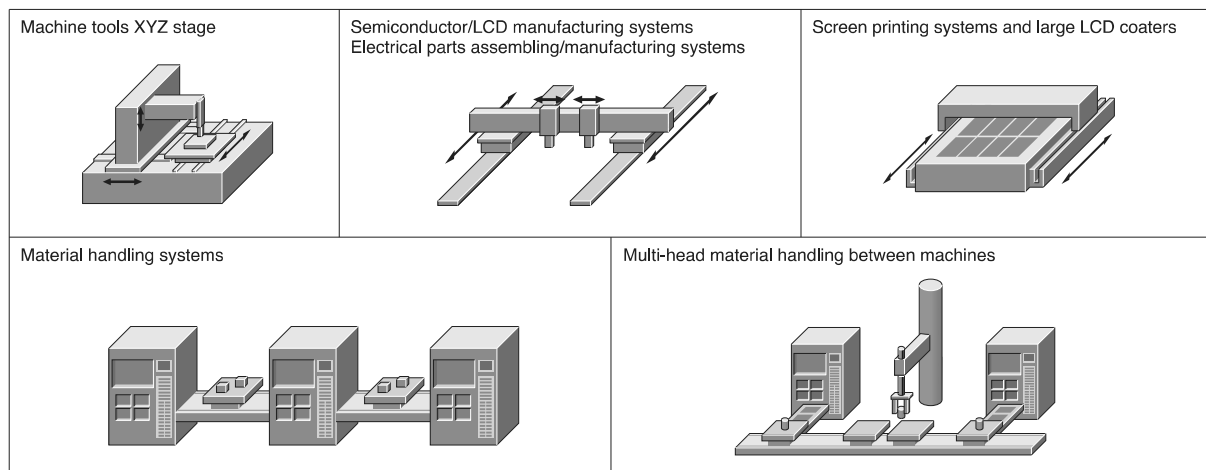
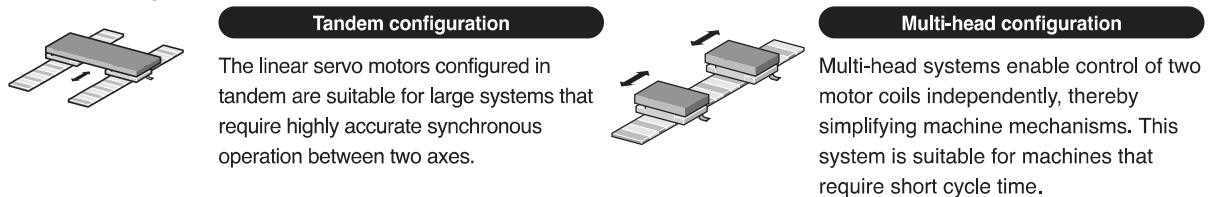
Product Lines

Four series are available depending on applications.



Application Examples

Optimum for a linear drive system which requires a high speed and high accuracy. Easily achieve a tandem configuration or multi-head configuration.



3 Linear Servo Motors

Model Designation	3-1
Combinations of Linear Servo Motor and Servo Amplifier.....	3-5
Specifications	
LM-H3 series.....	3-7
LM-F series	3-9
LM-K2 series.....	3-11
LM-U2 series.....	3-13
Dimensions	
LM-H3 series.....	3-15
LM-F series	3-17
LM-K2 series.....	3-19
LM-U2 series.....	3-21
List of Linear Encoders	3-23
Sizing Example.....	3-24

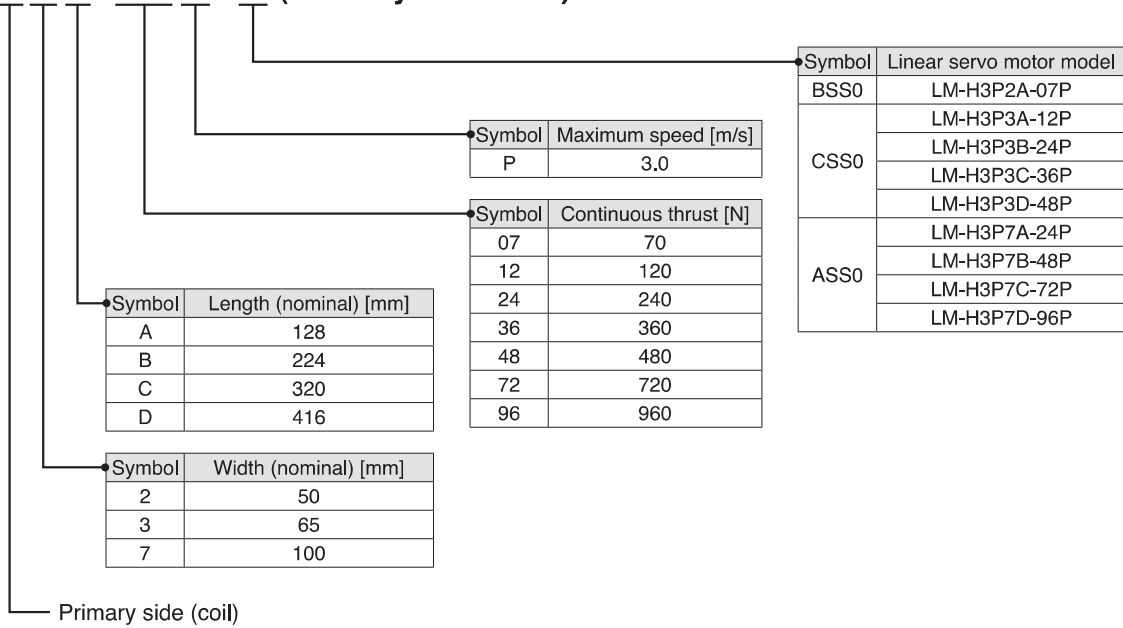
* Refer to p. 5-89 in this catalog for conversion of units.

Linear Servo Motors

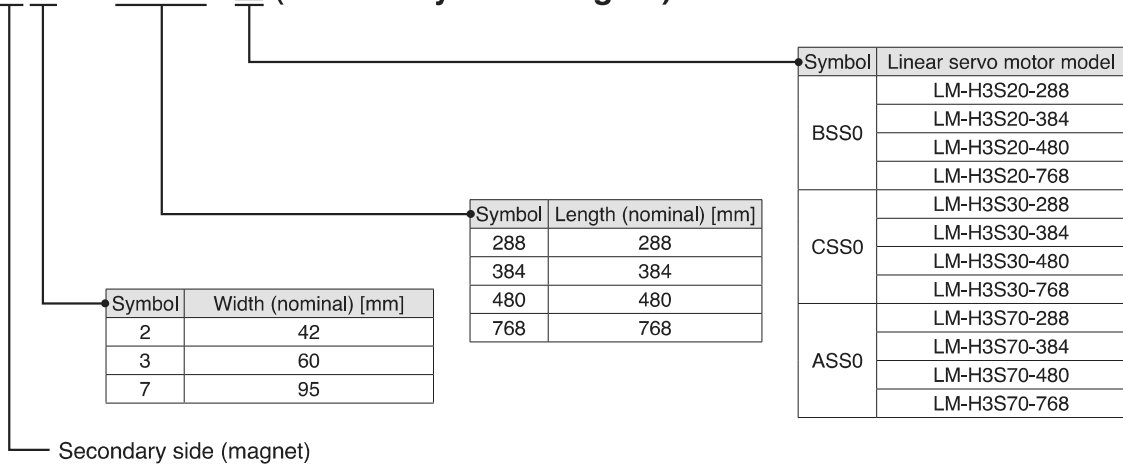
Model Designation

● LM-H3 series

L M - H 3 P 2 A - 0 7 P - □ (Primary side: coil)



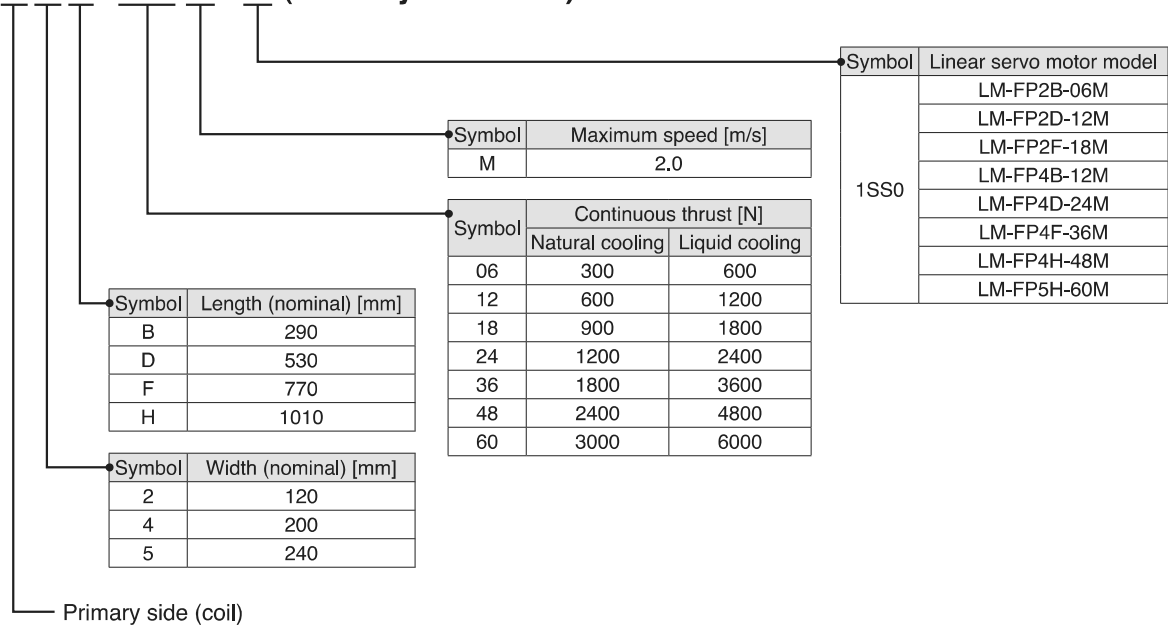
L M - H 3 S 2 0 - 2 8 8 - □ (Secondary side: magnet)



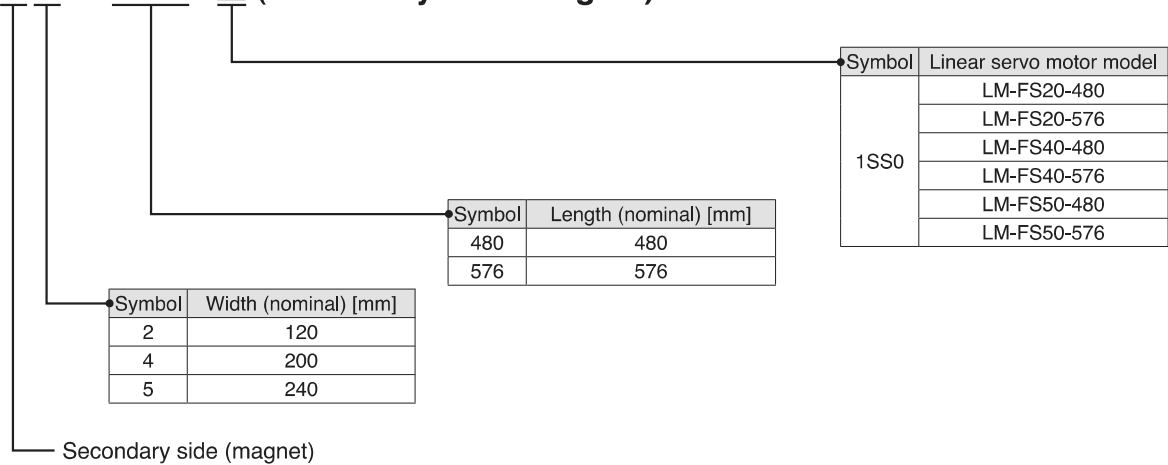
Model Designation

● LM-F series

LM - FP 2 B - 06 M - □ (Primary side: coil)



LM - FS 20 - 480 - □ (Secondary side: magnet)



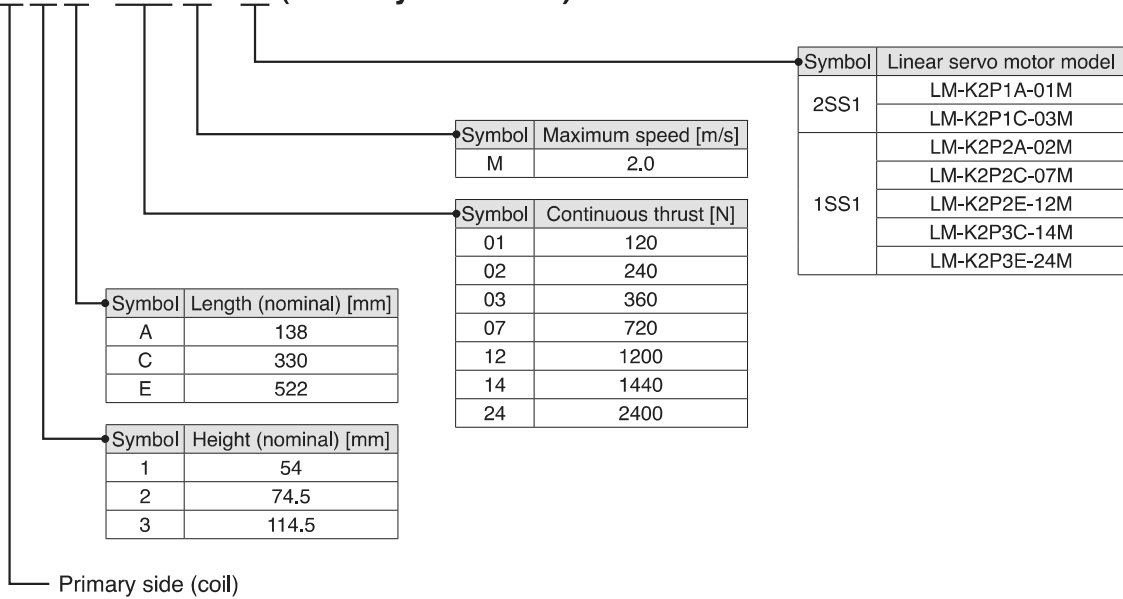
- Servo Amplifiers
- Rotary Servo Motors
- Linear Servo Motors**
- Direct Drive Motors
- Options/Peripheral Equipment
- LVS/Wires
- Product List
- Cautions

Linear Servo Motors

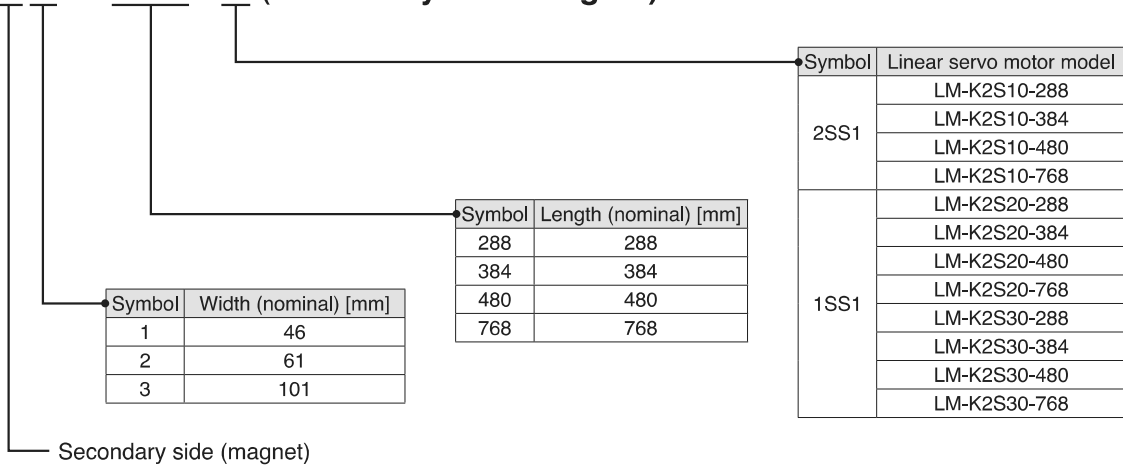
Model Designation

● LM-K2 series

L M - K 2 P 1 A - 0 1 M - □ (Primary side: coil)



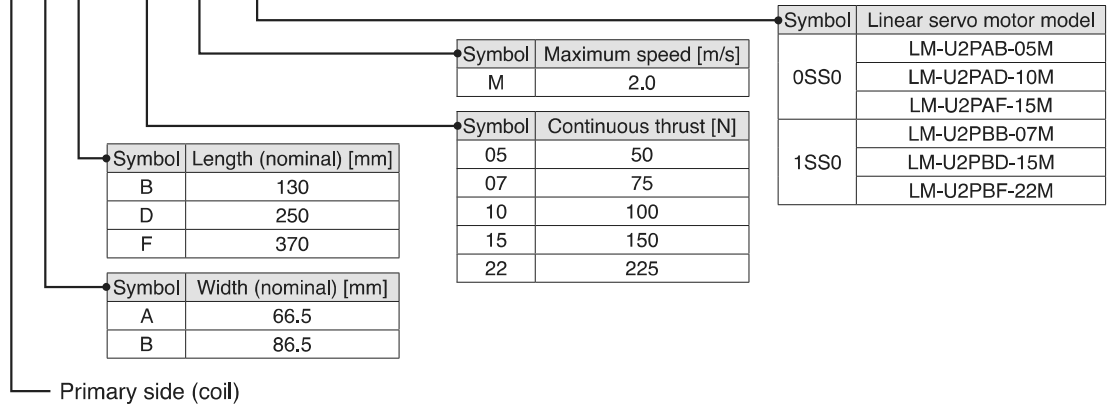
L M - K 2 S 1 0 - 2 8 8 - □ (Secondary side: magnet)



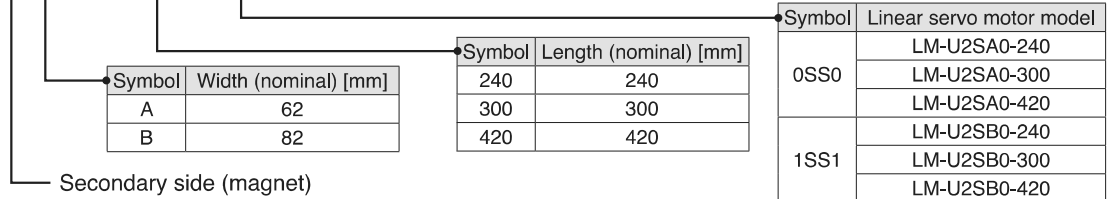
Model Designation

●LM-U2 (medium thrust) series

LM - U 2 P A B - 0 5 M - □ (Primary side: coil)

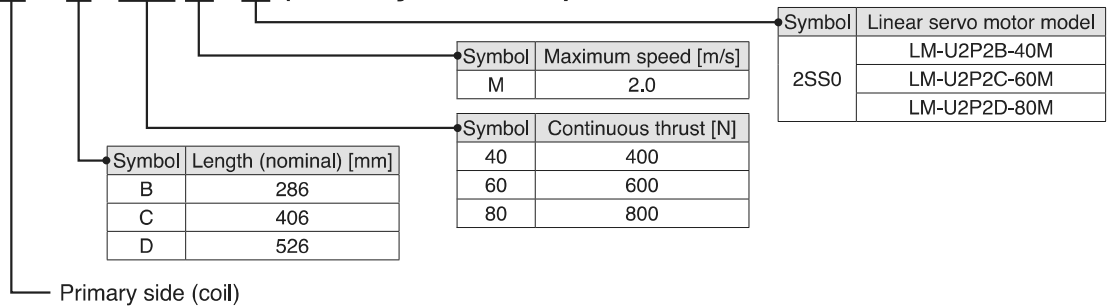


LM - U 2 S A 0 - 2 4 0 - □ (Secondary side: magnet)

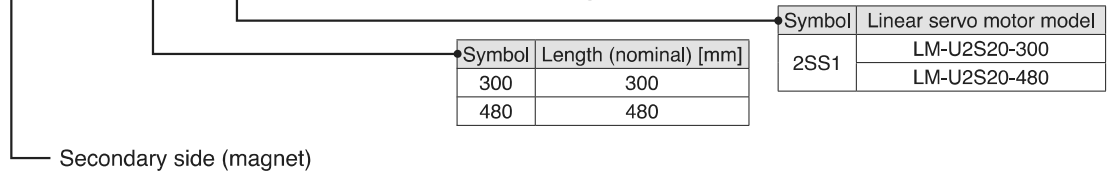


●LM-U2 (large thrust) series

LM - U 2 P 2 B - 4 0 M - □ (Primary side: coil)



LM - U 2 S 2 0 - 3 0 0 - □ (Secondary side: magnet)



Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVS/Wires

Product List

Cautions

Linear Servo Motors

Combinations of Linear Servo Motor and Servo Amplifier

	Linear servo motor		Servo amplifier		
	Primary side (coil)	Secondary side (magnet)	MR-J4	MR-J4W2 (Note 1)	MR-J4W3 (Note 1)
LM-H3 series	LM-H3P2A-07P-BSS0	LM-H3S20-288-BSS0, LM-H3S20-384-BSS0, LM-H3S20-480-BSS0, LM-H3S20-768-BSS0	MR-J4-40GF(-RJ) (Note 2), MR-J4-40B(-RJ), MR-J4-40B1(-RJ), MR-J4-40A(-RJ), MR-J4-40A1(-RJ)	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	MR-J4W3-444B
	LM-H3P3A-12P-CSS0		MR-J4-40GF(-RJ) (Note 2), MR-J4-40B(-RJ), MR-J4-40B1(-RJ), MR-J4-40A(-RJ), MR-J4-40A1(-RJ)	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	MR-J4W3-444B
	LM-H3P3B-24P-CSS0	LM-H3S30-288-CSS0, LM-H3S30-384-CSS0, LM-H3S30-480-CSS0, LM-H3S30-768-CSS0	MR-J4-70GF(-RJ) (Note 2), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	LM-H3P3C-36P-CSS0		MR-J4-70GF(-RJ) (Note 2), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	LM-H3P3D-48P-CSS0		MR-J4-200GF(-RJ) (Note 2), MR-J4-200B(-RJ), MR-J4-200A(-RJ)	-	-
	LM-H3P7A-24P-ASS0		MR-J4-70GF(-RJ) (Note 2), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	LM-H3P7B-48P-ASS0	LM-H3S70-288-ASS0, LM-H3S70-384-ASS0, LM-H3S70-480-ASS0, LM-H3S70-768-ASS0	MR-J4-200GF(-RJ) (Note 2), MR-J4-200B(-RJ), MR-J4-200A(-RJ)	-	-
	LM-H3P7C-72P-ASS0		MR-J4-200GF(-RJ) (Note 2), MR-J4-200B(-RJ), MR-J4-200A(-RJ)	-	-
	LM-H3P7D-96P-ASS0		MR-J4-350GF(-RJ) (Note 2), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
LM-F series	LM-FP2B-06M-1SS0		MR-J4-200GF(-RJ) (Note 2), MR-J4-200B(-RJ), MR-J4-200A(-RJ)	-	-
	LM-FP2D-12M-1SS0	LM-FS20-480-1SS0, LM-FS20-576-1SS0	MR-J4-500GF(-RJ) (Note 2), MR-J4-500B(-RJ), MR-J4-500A(-RJ)	-	-
	LM-FP2F-18M-1SS0		MR-J4-700GF(-RJ) (Note 2), MR-J4-700B(-RJ), MR-J4-DU900B(-RJ), MR-J4-700A(-RJ)	-	-
	LM-FP4B-12M-1SS0		MR-J4-500GF(-RJ) (Note 2), MR-J4-500B(-RJ), MR-J4-500A(-RJ)	-	-
	LM-FP4D-24M-1SS0		MR-J4-700GF(-RJ) (Note 2), MR-J4-700B(-RJ), MR-J4-DU900B(-RJ), MR-J4-700A(-RJ)	-	-
	LM-FP4F-36M-1SS0	LM-FS40-480-1SS0, LM-FS40-576-1SS0	MR-J4-11KGF(-RJ) (Note 2), MR-J4-11KB(-RJ), MR-J4-DU11KB(-RJ), MR-J4-11KA(-RJ)	-	-
	LM-FP4H-48M-1SS0		MR-J4-15KGF(-RJ) (Note 2), MR-J4-15KB(-RJ), MR-J4-DU15KB(-RJ), MR-J4-15KA(-RJ)	-	-
LM-FP5H-60M-1SS0	LM-FS50-480-1SS0, LM-FS50-576-1SS0	MR-J4-22KGF4(-RJ) (Note 2), MR-J4-22KB4(-RJ), MR-J4-DU22KB4(-RJ), MR-J4-22KA4(-RJ)	-	-	

Notes: 1. Any combination of the servo motors is available. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motors" on p. 1-8 in this catalog.
2. MR-J4_G(-RJ) with software version A1 or later supports the linear servo motor.

Combinations of Linear Servo Motor and Servo Amplifier

	Linear servo motor		Servo amplifier		
	Primary side (coil)	Secondary side (magnet)	MR-J4	MR-J4W2 (Note 1)	MR-J4W3 (Note 1)
LM-K2 series	LM-K2P1A-01M-2SS1	LM-K2S10-288-2SS1, LM-K2S10-384-2SS1, LM-K2S10-480-2SS1,	MR-J4-40GF(-RJ) (Note 2), MR-J4-40B(-RJ), MR-J4-40B1(-RJ), MR-J4-40A(-RJ), MR-J4-40A1(-RJ)	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	MR-J4W3-444B
	LM-K2P1C-03M-2SS1	LM-K2S10-768-2SS1	MR-J4-200GF(-RJ) (Note 2), MR-J4-200B(-RJ), MR-J4-200A(-RJ)	-	-
	LM-K2P2A-02M-1SS1		MR-J4-70GF(-RJ) (Note 2), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	LM-K2P2C-07M-1SS1	LM-K2S20-288-1SS1, LM-K2S20-384-1SS1, LM-K2S20-480-1SS1, LM-K2S20-768-1SS1	MR-J4-350GF(-RJ) (Note 2), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
	LM-K2P2E-12M-1SS1		MR-J4-500GF(-RJ) (Note 2), MR-J4-500B(-RJ), MR-J4-500A(-RJ)	-	-
	LM-K2P3C-14M-1SS1	LM-K2S30-288-1SS1, LM-K2S30-384-1SS1,	MR-J4-350GF(-RJ) (Note 2), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
	LM-K2P3E-24M-1SS1	LM-K2S30-480-1SS1, LM-K2S30-768-1SS1	MR-J4-500GF(-RJ) (Note 2), MR-J4-500B(-RJ), MR-J4-500A(-RJ)	-	-
LM-U2 series	LM-U2PAB-05M-0SS0		MR-J4-20GF(-RJ) (Note 2), MR-J4-20B(-RJ), MR-J4-20B1(-RJ), MR-J4-20A(-RJ), MR-J4-20A1(-RJ)	MR-J4W2-22B, MR-J4W2-44B	MR-J4W3-222B, MR-J4W3-444B
	LM-U2PAD-10M-0SS0	LM-U2SA0-240-0SS0, LM-U2SA0-300-0SS0, LM-U2SA0-420-0SS0	MR-J4-40GF(-RJ) (Note 2), MR-J4-40B(-RJ), MR-J4-40B1(-RJ), MR-J4-40A(-RJ), MR-J4-40A1(-RJ)	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	MR-J4W3-444B
	LM-U2PAF-15M-0SS0		MR-J4-40GF(-RJ) (Note 2), MR-J4-40B(-RJ), MR-J4-40B1(-RJ), MR-J4-40A(-RJ), MR-J4-40A1(-RJ)	MR-J4W2-44B, MR-J4W2-77B, MR-J4W2-1010B	MR-J4W3-444B
	LM-U2PBB-07M-1SS0		MR-J4-20GF(-RJ) (Note 2), MR-J4-20B(-RJ), MR-J4-20B1(-RJ), MR-J4-20A(-RJ), MR-J4-20A1(-RJ)	MR-J4W2-22B, MR-J4W2-44B	MR-J4W3-222B, MR-J4W3-444B
	LM-U2PBD-15M-1SS0	LM-U2SB0-240-1SS1, LM-U2SB0-300-1SS1, LM-U2SB0-420-1SS1	MR-J4-60GF(-RJ) (Note 2), MR-J4-60B(-RJ), MR-J4-60A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	LM-U2PBF-22M-1SS0		MR-J4-70GF(-RJ) (Note 2), MR-J4-70B(-RJ), MR-J4-70A(-RJ)	MR-J4W2-77B, MR-J4W2-1010B	-
	LM-U2P2B-40M-2SS0		MR-J4-200GF(-RJ) (Note 2), MR-J4-200B(-RJ), MR-J4-200A(-RJ)	-	-
	LM-U2P2C-60M-2SS0	LM-U2S20-300-2SS1, LM-U2S20-480-2SS1	MR-J4-350GF(-RJ) (Note 2), MR-J4-350B(-RJ), MR-J4-350A(-RJ)	-	-
LM-U2P2D-80M-2SS0		MR-J4-500GF(-RJ) (Note 2), MR-J4-500B(-RJ), MR-J4-500A(-RJ)	-	-	

Notes: 1. Any combination of the servo motors is available. Refer to "Combinations of Multi-Axis Servo Amplifier and Servo Motors" on p. 1-8 in this catalog.
 2. MR-J4-_GF(-RJ) with software version A1 or later supports the linear servo motor.

Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVSMWires

Product List

Cautions

Linear Servo Motors

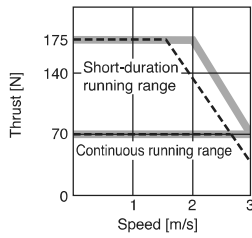
LM-H3 Series Specifications

Linear servo motor model	Primary side (coil)	LM-H3	P2A-07P-BSS0	P3A-12P-CSS0	P3B-24P-CSS0	P3C-36P-CSS0	P3D-48P-CSS0	P7A-24P-ASS0	P7B-48P-ASS0	P7C-72P-ASS0	P7D-96P-ASS0
	Secondary side (magnet)	LM-H3	S20-288-BSS0 S20-384-BSS0 S20-480-BSS0 S20-768-BSS0	S30-288-CSS0 S30-384-CSS0 S30-480-CSS0 S30-768-CSS0				S70-288-ASS0 S70-384-ASS0 S70-480-ASS0 S70-768-ASS0			
Compatible servo amplifier model	MR-J4- MR-J4W_-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on p. 3-5 in this catalog.									
Power supply capacity	[kVA]	0.9	0.9	1.3	1.9	3.5	1.3	3.5	3.8	5.5	
Cooling method	Natural cooling										
Thrust	Continuous ^(Note 5)	[N]	70	120	240	360	480	240	480	720	960
	Maximum	[N]	175	300	600	900	1200	600	1200	1800	2400
Maximum speed ^(Note 1)	[m/s]	3.0									
Magnetic attraction force	[N]	630	1100	2200	3300	4400	2200	4400	6600	8800	
Rated current	[A]	1.8	1.7	3.4	5.1	6.8	3.4	6.8	10.2	13.6	
Maximum current	[A]	5.8	5.0	9.9	14.9	19.8	9.6	19.1	28.6	38.1	
Regenerative braking frequency ^(Note 2)	MR-J4- [times/min]	175	95	108	78	300	108	308	210	159	
	MR-J4W_- [times/min]	173 ^(Note 3)	95 ^(Note 4)	271	197	-	241	-	-	-	
Recommended load to motor mass ratio	Maximum of 35 times the mass of the linear servo motor primary side										
Thermistor	Built-in										
Insulation class	155 (F)										
Structure	Open (IP rating: IP00)										
Environment	Ambient temperature	Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)									
	Ambient humidity	Operation: 10 %RH to 80 %RH (non-condensing), storage: 10 %RH to 90 %RH (non-condensing)									
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust									
	Altitude	1000 m or less above sea level									
Vibration resistance	49 m/s ²										
Compliance with global standards	Refer to "Compliance with Global Standards and Regulations" on p. 55 in this catalog.										
Mass	Primary side (coil)	[kg]	0.9	1.3	2.3	3.3	4.3	2.2	3.9	5.6	7.3
	Secondary side (magnet)	[kg]	288 mm/pc: 0.7 384 mm/pc: 0.9 480 mm/pc: 1.1 768 mm/pc: 1.8	288 mm/pc: 1.0 384 mm/pc: 1.4 480 mm/pc: 1.7 768 mm/pc: 2.7				288 mm/pc: 2.8 384 mm/pc: 3.7 480 mm/pc: 4.7 768 mm/pc: 7.4			

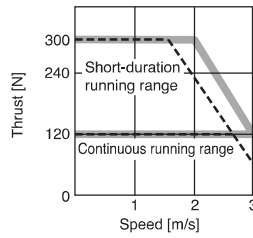
- Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
3. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 942 for MR-J4W2-77B or MR-J4W2-1010B.
4. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 497 for MR-J4W2-77B or MR-J4W2-1010B.
5. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-H3 Series Thrust Characteristics

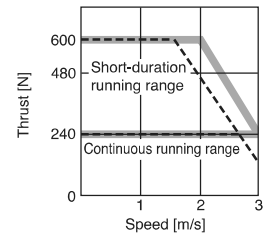
LM-H3P2A-07P-BSS0 (Note 1, 2, 4)



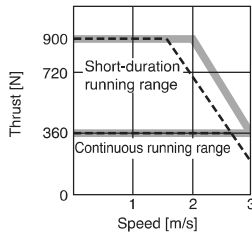
LM-H3P3A-12P-CSS0 (Note 1, 2, 4)



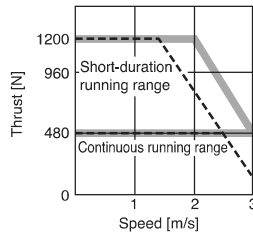
LM-H3P3B-24P-CSS0 (Note 1, 3, 4)



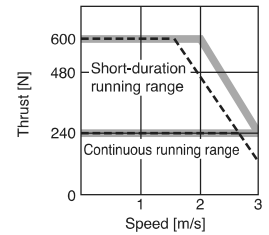
LM-H3P3C-36P-CSS0 (Note 1, 3, 4)



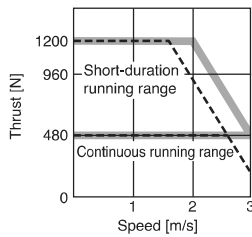
LM-H3P3D-48P-CSS0 (Note 1, 3, 4)



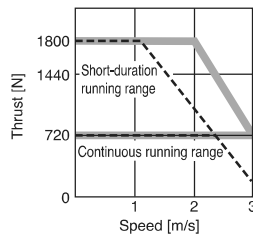
LM-H3P7A-24P-ASS0 (Note 1, 3, 4)



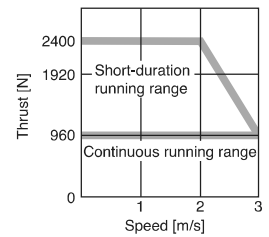
LM-H3P7B-48P-ASS0 (Note 1, 3, 4)



LM-H3P7C-72P-ASS0 (Note 1, 3, 4)



LM-H3P7D-96P-ASS0 (Note 1, 4)



- Notes: 1. — : For 3-phase 200 V AC.
 2. - - - : For 1-phase 200 V AC or 1-phase 100 V AC.
 3. - - - : For 1-phase 200 V AC.
 4. Thrust drops when the power supply voltage is below the specified value.

Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVSMWres

Product List

Cautions

Linear Servo Motors

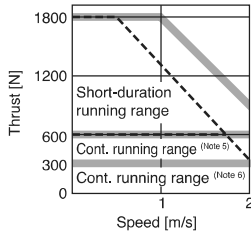
LM-F Series Specifications

Linear servo motor model	Primary side (coil)	LM-F	P2B-06M-1SS0	P2D-12M-1SS0	P2F-18M-1SS0	P4B-12M-1SS0	P4D-24M-1SS0	P4F-36M-1SS0	P4H-48M-1SS0	P5H-60M-1SS0 (Note 3)
	Secondary side (magnet)	LM-F	S20-480-1SS0 S20-576-1SS0			S40-480-1SS0 S40-576-1SS0			S50-480-1SS0 (Note 3) S50-576-1SS0 (Note 3)	
Compatible servo amplifier model		MR-J4-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on p. 3-5 in this catalog.							
Power supply capacity		[kVA]	3.5	7.5	10	7.5	10	14	18	22
Cooling method			Natural cooling or liquid cooling							
Thrust	Continuous (natural cooling) (Note 4)	[N]	300	600	900	600	1200	1800	2400	3000
	Continuous (liquid cooling) (Note 4)	[N]	600	1200	1800	1200	2400	3600	4800	6000
	Maximum	[N]	1800	3600	5400	3600	7200	10800	14400	18000
Maximum speed (Note 1)		[m/s]	2.0							
Magnetic attraction force		[N]	4500	9000	13500	9000	18000	27000	36000	45000
Rated current	Natural cooling	[A]	4.0	7.8	12	7.8	15	21	28	22
	Liquid cooling	[A]	7.8	16	23	17	31	44	59	45
Maximum current		[A]	30	58	87	57	109	159	212	157
Regenerative braking frequency (Note 2)	MR-J4-	Natural cooling [times/min]	348	264	318	393	169	577	715	4230
		Liquid cooling [times/min]	671	396	No limit	366	224	859	1050	No limit
Recommended load to motor mass ratio			Maximum of 15 times the mass of the linear servo motor primary side							
Thermistor			Built-in							
Insulation class			155 (F)							
Structure			Open (IP rating: IP00)							
Environment	Ambient temperature		Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity		Operation: 10 %RH to 80 %RH (non-condensing), storage: 10 %RH to 90 %RH (non-condensing)							
	Ambience		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude		1000 m or less above sea level							
Vibration resistance			49 m/s ²							
Compliance with global standards			Refer to "Compliance with Global Standards and Regulations" on p. 55 in this catalog.							
Mass	Primary side (coil)	[kg]	9.0	18	27	14	28	42	56	67
	Secondary side (magnet)	[kg]	480 mm/pc: 7.0 576 mm/pc: 9.0			480 mm/pc: 12 576 mm/pc: 15			480 mm/pc: 20 576 mm/pc: 24	

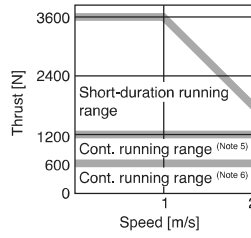
- Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
3. Use a 400 V AC type servo amplifier for this linear servo motor.
4. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-F Series Thrust Characteristics

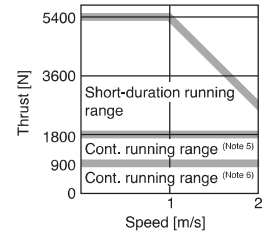
LM-FP2B-06M-1SS0 (Note 1, 3, 4)



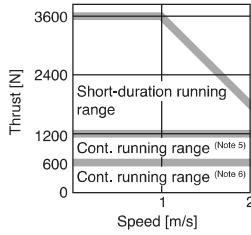
LM-FP2D-12M-1SS0 (Note 1, 4)



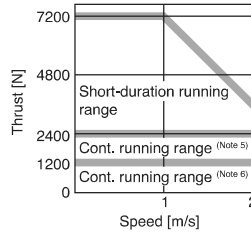
LM-FP2F-18M-1SS0 (Note 1, 4)



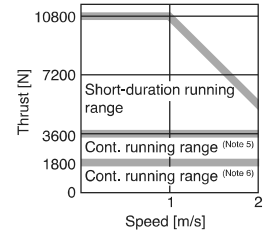
LM-FP4B-12M-1SS0 (Note 1, 4)



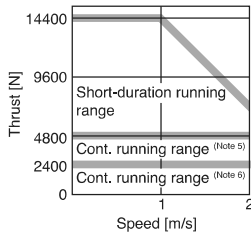
LM-FP4D-24M-1SS0 (Note 1, 4)



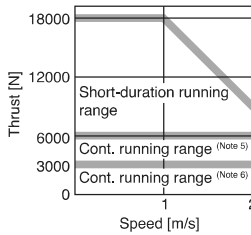
LM-FP4F-36M-1SS0 (Note 1, 4)



LM-FP4H-48M-1SS0 (Note 1, 4)



LM-FP5H-60M-1SS0 (Note 2, 4)



- Notes: 1. : For 3-phase 200 V AC.
 2. : For 3-phase 400 V AC.
 3. : For 1-phase 200 V AC.
 4. Thrust drops when the power supply voltage is below the specified value.
 5. Continuous running range (liquid cooling)
 6. Continuous running range (natural cooling)

Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVSWires

Product List

Cautions

Linear Servo Motors

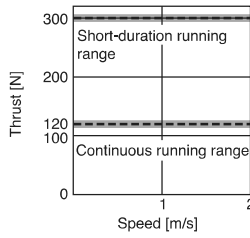
LM-K2 Series Specifications

Linear servo motor model	Primary side (coil)	LM-K2	P1A-01M-2SS1	P1C-03M-2SS1	P2A-02M-1SS1	P2C-07M-1SS1	P2E-12M-1SS1	P3C-14M-1SS1	P3E-24M-1SS1
	Secondary side (magnet) ^(Note 4)	LM-K2	S10-288-2SS1 S10-384-2SS1 S10-480-2SS1 S10-768-2SS1			S20-288-1SS1 S20-384-1SS1 S20-480-1SS1 S20-768-1SS1		S30-288-1SS1 S30-384-1SS1 S30-480-1SS1 S30-768-1SS1	
Compatible servo amplifier model	MR-J4- MR-J4W_-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on p. 3-6 in this catalog.							
Power supply capacity	[kVA]	0.9	3.5	1.3	5.5	7.5	5.5	7.5	
Cooling method	Natural cooling								
Thrust	Continuous ^(Note 5)	[N]	120	360	240	720	1200	1440	2400
	Maximum	[N]	300	900	600	1800	3000	3600	6000
Maximum speed ^(Note 1)	[m/s]	2.0							
Magnetic attraction force ^(Note 6)	[N]	0							
Magnetic attraction force (one side) ^(Note 7)		800	2400	1100	3200	5300	6400	10700	
Rated current	[A]	2.3	6.8	3.7	12	19	15	25	
Maximum current	[A]	7.6	23	13	39	65	47	79	
Regenerative braking frequency ^(Note 2)	MR-J4-	[times/min]	111	427	142	281	226	152	124
	MR-J4W_-	[times/min]	110 ^(Note 3)	-	355	-	-	-	-
Recommended load to motor mass ratio	Maximum of 30 times the mass of the linear servo motor primary side								
Thermistor	Built-in								
Insulation class	155 (F)								
Structure	Open (IP rating: IP00)								
Environment	Ambient temperature	Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)							
	Ambient humidity	Operation: 10 %RH to 80 %RH (non-condensing), storage: 10 %RH to 90 %RH (non-condensing)							
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Altitude	1000 m or less above sea level							
	Vibration resistance	49 m/s ²							
Compliance with global standards	Refer to "Compliance with Global Standards and Regulations" on p. 55 in this catalog.								
Mass	Primary side (coil)	[kg]	2.5	6.5	4.0	10	16	18	27
	Secondary side (magnet)	[kg]	288 mm/pc: 1.5 384 mm/pc: 2.0 480 mm/pc: 2.5 768 mm/pc: 3.9			288 mm/pc: 1.9 384 mm/pc: 2.5 480 mm/pc: 3.2 768 mm/pc: 5.0		288 mm/pc: 5.5 384 mm/pc: 7.3 480 mm/pc: 9.2 768 mm/pc: 14.6	

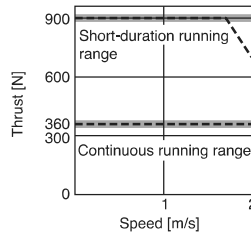
- Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
3. This value is applicable when MR-J4W2-44B or MR-J4W3-444B is used. The value is 584 for MR-J4W2-77B or MR-J4W2-1010B.
4. LM-K2 series has a structure of magnetic attraction counter-force and requires at least two blocks of identical secondary side (magnet).
5. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.
6. Magnetic attraction force is caused by assembly precision, etc.
7. Magnetic attraction force which occurs on one side of the secondary side is shown.

LM-K2 Series Thrust Characteristics

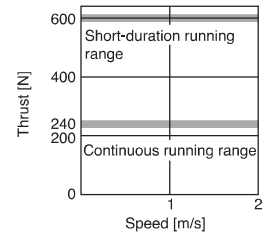
LM-K2P1A-01M-2SS1 (Note 1, 3, 5)



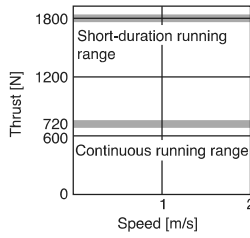
LM-K2P1C-03M-2SS1 (Note 2, 4, 5)



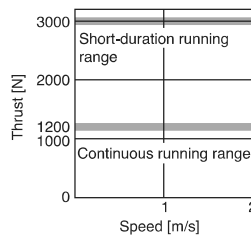
LM-K2P2A-02M-1SS1 (Note 1, 5)



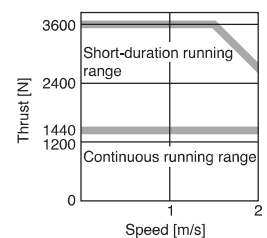
LM-K2P2C-07M-1SS1 (Note 2, 5)



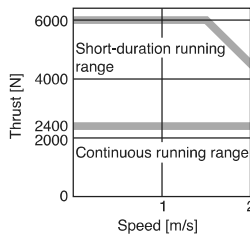
LM-K2P2E-12M-1SS1 (Note 2, 5)



LM-K2P3C-14M-1SS1 (Note 2, 5)



LM-K2P3E-24M-1SS1 (Note 2, 5)



- Notes: 1. — : For 3-phase 200 V AC or 1-phase 200 V AC.
 2. — : For 3-phase 200 V AC.
 3. - - - : For 1-phase 100 V AC.
 4. - - - : For 1-phase 200 V AC.
 5. Thrust drops when the power supply voltage is below the specified value.

Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVSM/res

Product List

Cautions

Linear Servo Motors

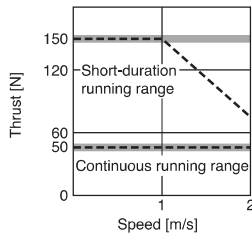
LM-U2 Series Specifications

Linear servo motor model	Primary side (coil)	LM-U2	PAB-05M-0SS0	PAD-10M-0SS0	PAF-15M-0SS0	PBB-07M-1SS0	PBD-15M-1SS0	PBF-22M-1SS0	P2B-40M-2SS0	P2C-60M-2SS0	P2D-80M-2SS0
	Secondary side (magnet)	LM-U2	SA0-240-0SS0 SA0-300-0SS0 SA0-420-0SS0			SB0-240-1SS1 SB0-300-1SS1 SB0-420-1SS1			S20-300-2SS1 S20-480-2SS1		
Compatible servo amplifier model	MR-J4- MR-J4W_-	Refer to "Combinations of Linear Servo Motor and Servo Amplifier" on p. 3-6 in this catalog.									
Power supply capacity	[kVA]	0.5	0.9	0.9	0.5	1.0	1.3	3.5	5.5	7.5	
Cooling method	Natural cooling										
Thrust	Continuous ^(Note 3)	[N]	50	100	150	75	150	225	400	600	800
	Maximum	[N]	150	300	450	225	450	675	1600	2400	3200
Maximum speed ^(Note 1)	[m/s]	2.0									
Magnetic attraction force	[N]	0									
Rated current	[A]	0.9	1.9	2.7	1.5	3.0	4.6	6.6	9.8	13.1	
Maximum current	[A]	2.7	5.5	8.3	4.5	8.9	13.7	26.7	40.3	53.7	
Regenerative braking frequency ^(Note 2)	MR-J4- [times/min]	No limit	No limit	No limit	No limit	3480	No limit	1820	2800	1190	
	MR-J4W_- [times/min]	No limit	No limit	No limit	6030	No limit	No limit	-	-	-	
Recommended load to motor mass ratio	Maximum of 30 times the mass of the linear servo motor primary side										
Thermistor	Built-in										
Insulation class	155 (F)										
Structure	Open (IP rating: IP00)										
Environment	Ambient temperature	Operation: 0 °C to 40 °C (non-freezing), storage: -15 °C to 70 °C (non-freezing)									
	Ambient humidity	Operation: 10 %RH to 80 %RH (non-condensing), storage: 10 %RH to 90 %RH (non-condensing)									
	Ambience	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust									
	Altitude	1000 m or less above sea level									
Vibration resistance	49 m/s ²										
Compliance with global standards	Refer to "Compliance with Global Standards and Regulations" on p. 55 in this catalog.										
Mass	Primary side (coil)	[kg]	0.3	0.6	0.8	0.4	0.8	1.1	2.9	4.2	5.5
	Secondary side (magnet)	[kg]	240 mm/pc: 2.0 300 mm/pc: 2.5 420 mm/pc: 3.5			240 mm/pc: 2.6 300 mm/pc: 3.2 420 mm/pc: 4.5			300 mm/pc: 9.6 480 mm/pc: 15.3		

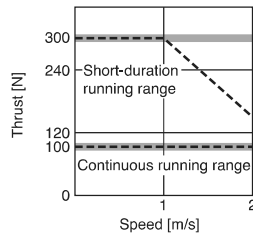
- Notes: 1. The maximum speed of the linear servo motor or the rated speed of the linear encoder, whichever is smaller, is the upper limit of the linear servo motor speed.
2. The regenerative braking frequency shows the permissible frequency when the linear servo motor, without a load and a regenerative option, decelerates from the maximum speed to a stop. When a load is connected; however, the value will be the table value/(m+1), where m = Mass of load/Mass of motor primary side (coil). Take measures to keep the regenerative power [W] during operation below the permissible regenerative power [W]. Use caution, especially when the operating speed changes frequently or when the regeneration is constant (as with vertical feeds). Select the most suitable regenerative option for your system with our capacity selection software. Refer to "Regenerative Option" in this catalog for the permissible regenerative power [W] when regenerative option is used.
3. Use the linear servo motor with 70% or less of the effective load ratio when it is in the servo lock state or in a small reciprocating motion.

LM-U2 Series Thrust Characteristics

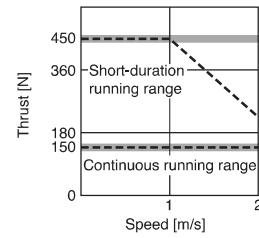
LM-U2PAB-05M-0SS0 (Note 1, 3, 5)



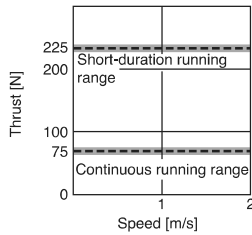
LM-U2PAD-10M-0SS0 (Note 1, 3, 5)



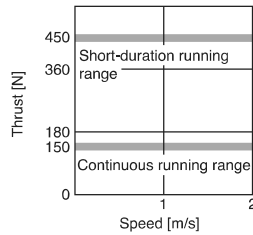
LM-U2PAF-15M-0SS0 (Note 1, 3, 5)



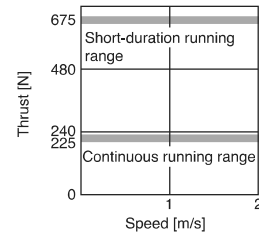
LM-U2PBB-07M-1SS0 (Note 1, 3, 5)



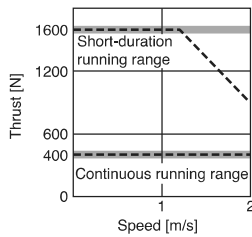
LM-U2PBD-15M-1SS0 (Note 1, 5)



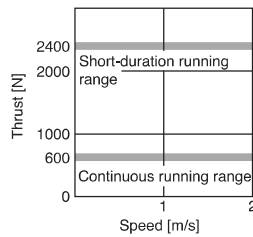
LM-U2PBF-22M-1SS0 (Note 1, 5)



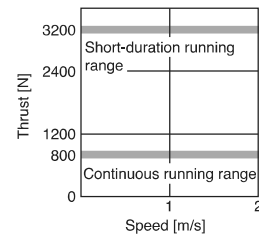
LM-U2P2B-40M-2SS0 (Note 2, 4, 5)



LM-U2P2C-60M-2SS0 (Note 2, 5)



LM-U2P2D-80M-2SS0 (Note 2, 5)



- Notes: 1. : For 3-phase 200 V AC or 1-phase 200 V AC.
 2. : For 3-phase 200 V AC.
 3. : For 1-phase 100 V AC.
 4. : For 1-phase 200 V AC.
 5. Thrust drops when the power supply voltage is below the specified value.

Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVSMWres

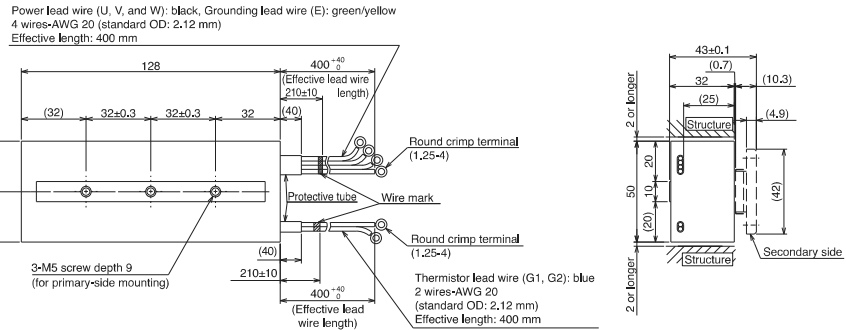
Product List

Cautions

Linear Servo Motors

LM-H3 Series Primary Side (Coil) Dimensions (Note 1, 2)

●LM-H3P2A-07P-BSS0



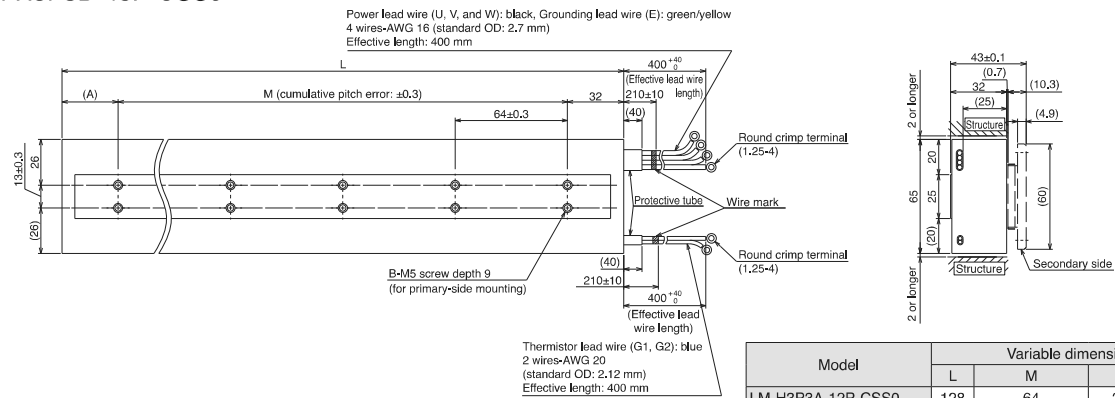
[Unit: mm]

●LM-H3P3A-12P-CSS0

●LM-H3P3B-24P-CSS0

●LM-H3P3C-36P-CSS0

●LM-H3P3D-48P-CSS0



[Unit: mm]

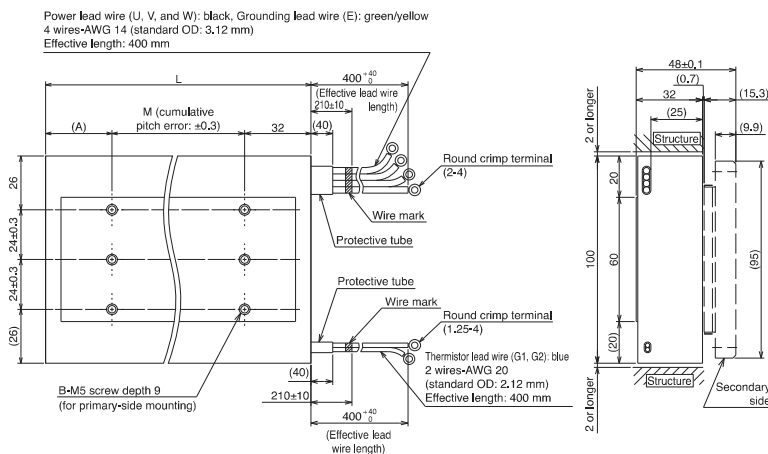
Model	Variable dimensions			
	L	M	A	B
LM-H3P3A-12P-CSS0	128	64	32	2 x 2
LM-H3P3B-24P-CSS0	224	2 x 64 = 128	64	2 x 3
LM-H3P3C-36P-CSS0	320	4 x 64 = 256	32	2 x 5
LM-H3P3D-48P-CSS0	416	5 x 64 = 320	64	2 x 6

●LM-H3P7A-24P-ASS0

●LM-H3P7B-48P-ASS0

●LM-H3P7C-72P-ASS0

●LM-H3P7D-96P-ASS0



[Unit: mm]

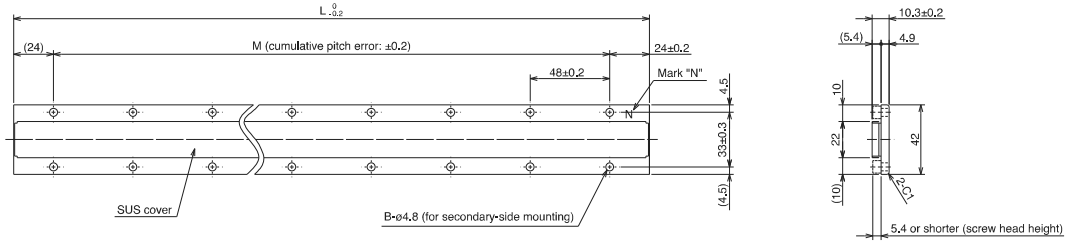
Model	Variable dimensions			
	L	M	A	B
LM-H3P7A-24P-ASS0	128	64	32	3 x 2
LM-H3P7B-48P-ASS0	224	2 x 64 = 128	64	3 x 3
LM-H3P7C-72P-ASS0	320	4 x 64 = 256	32	3 x 5
LM-H3P7D-96P-ASS0	416	5 x 64 = 320	64	3 x 6

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.

2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-H3 Series Secondary Side (Magnet) Dimensions

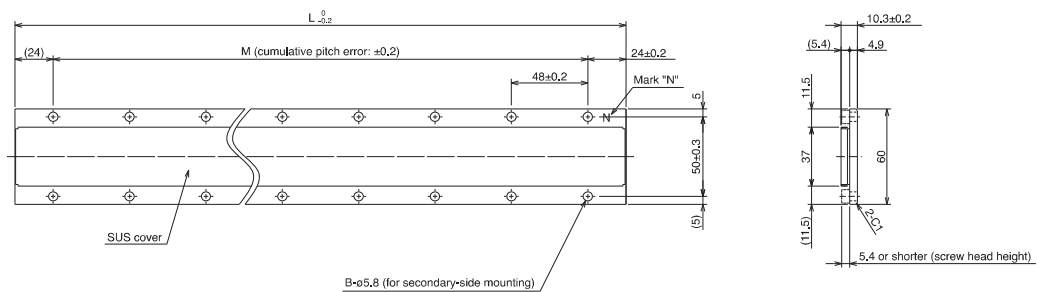
- LM-H3S20-288-BSS0 ● LM-H3S20-384-BSS0 ● LM-H3S20-480-BSS0
- LM-H3S20-768-BSS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S20-288-BSS0	288	5 × 48 = 240	2 × 6
LM-H3S20-384-BSS0	384	7 × 48 = 336	2 × 8
LM-H3S20-480-BSS0	480	9 × 48 = 432	2 × 10
LM-H3S20-768-BSS0	768	15 × 48 = 720	2 × 16

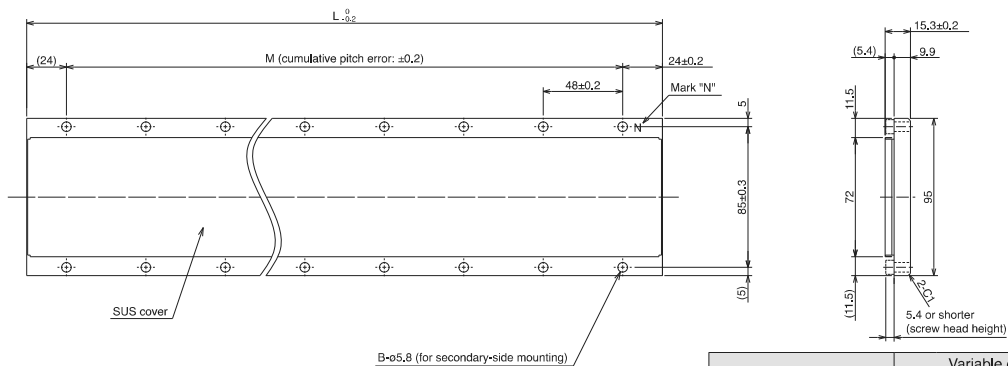
- LM-H3S30-288-CSS0 ● LM-H3S30-384-CSS0 ● LM-H3S30-480-CSS0
- LM-H3S30-768-CSS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S30-288-CSS0	288	5 × 48 = 240	2 × 6
LM-H3S30-384-CSS0	384	7 × 48 = 336	2 × 8
LM-H3S30-480-CSS0	480	9 × 48 = 432	2 × 10
LM-H3S30-768-CSS0	768	15 × 48 = 720	2 × 16

- LM-H3S70-288-ASS0 ● LM-H3S70-384-ASS0 ● LM-H3S70-480-ASS0
- LM-H3S70-768-ASS0



[Unit: mm]

Model	Variable dimensions		
	L	M	B
LM-H3S70-288-ASS0	288	5 × 48 = 240	2 × 6
LM-H3S70-384-ASS0	384	7 × 48 = 336	2 × 8
LM-H3S70-480-ASS0	480	9 × 48 = 432	2 × 10
LM-H3S70-768-ASS0	768	15 × 48 = 720	2 × 16

Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVSWires

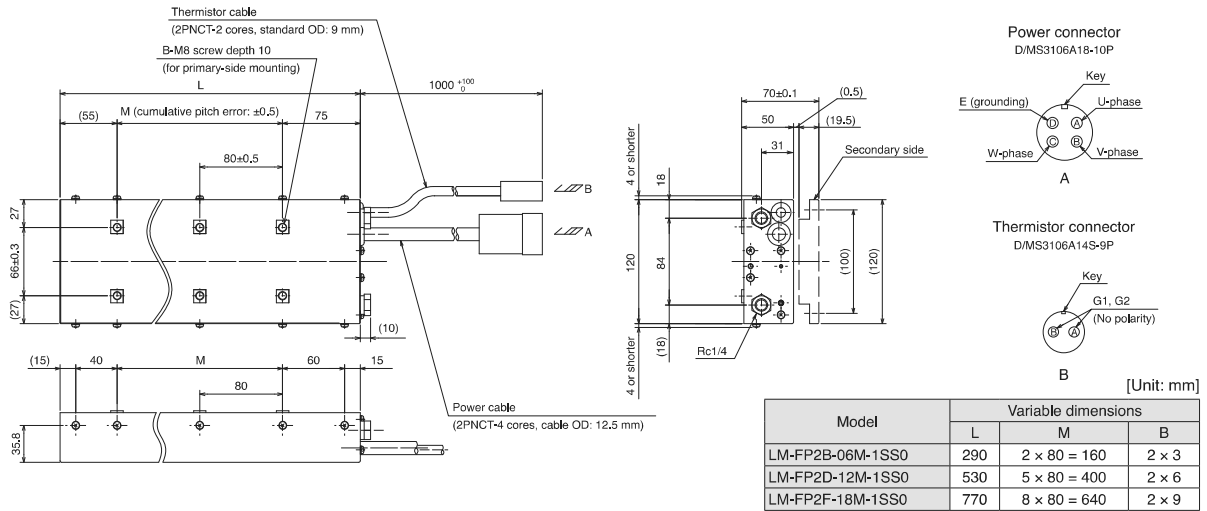
Product List

Cautions

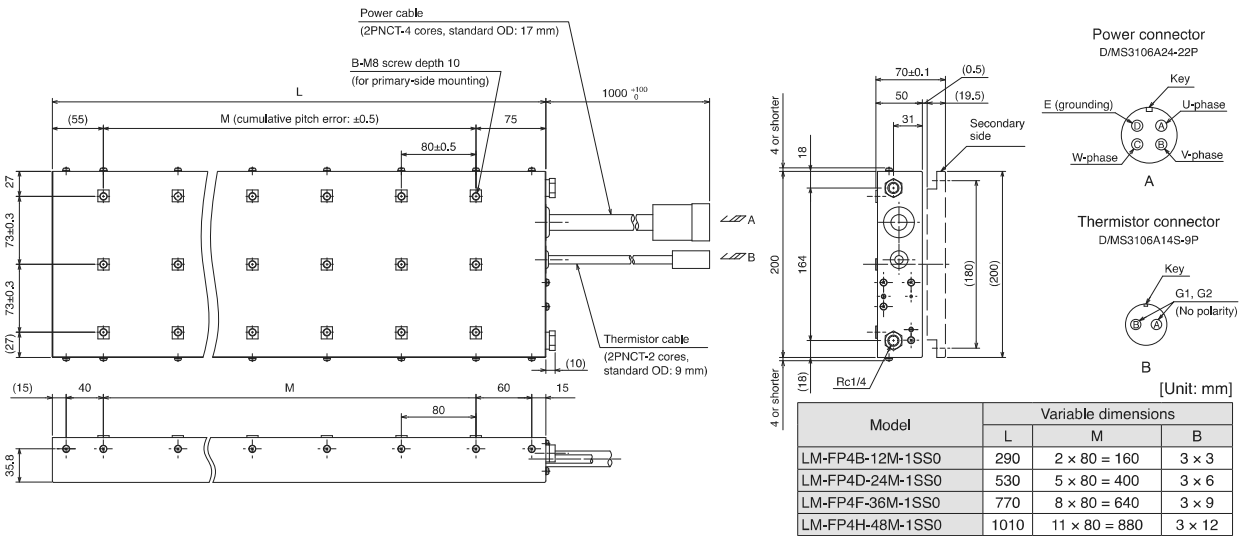
Linear Servo Motors

LM-F Series Primary Side (Coil) Dimensions (Note 1, 2)

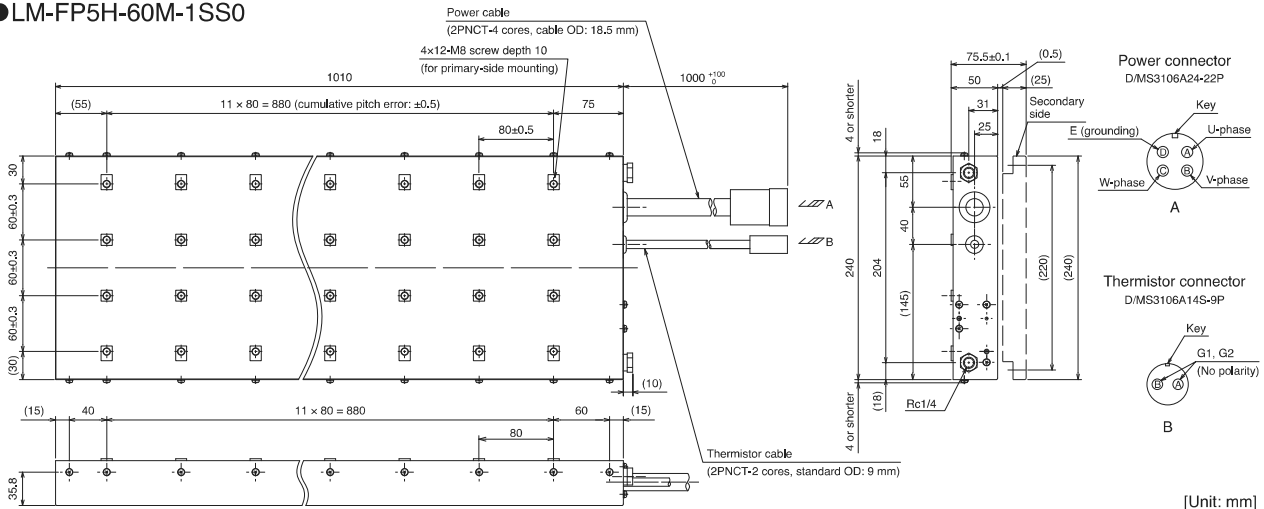
- LM-FP2B-06M-1SS0 ● LM-FP2D-12M-1SS0 ● LM-FP2F-18M-1SS0



- LM-FP4B-12M-1SS0 ● LM-FP4D-24M-1SS0 ● LM-FP4F-36M-1SS0 ● LM-FP4H-48M-1SS0



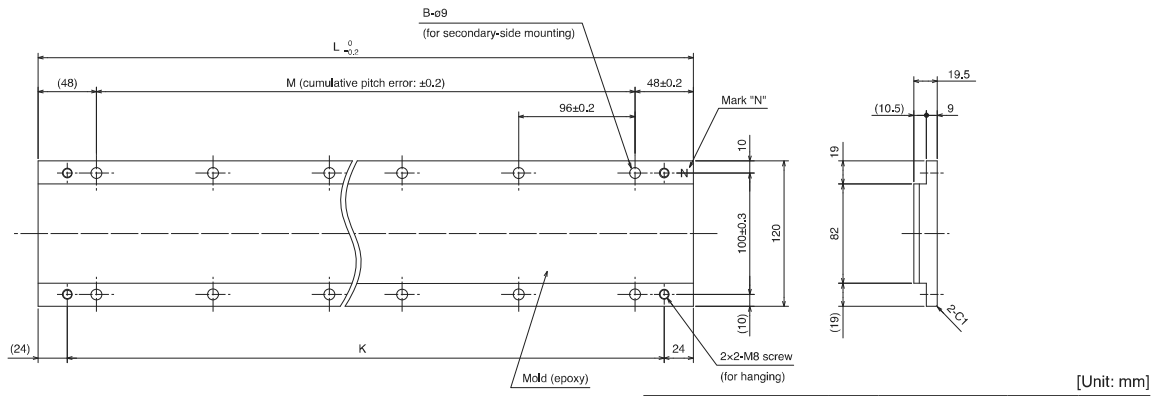
- LM-FP5H-60M-1SS0



Notes: 1. Power and thermistor cables do not have a long bending life. Fix the cables led from the primary side (coil) to a moving part to prevent the cables from repetitive bending.
2. Minimum bending radius of the cable equals to six times the standard overall diameter of the cable.

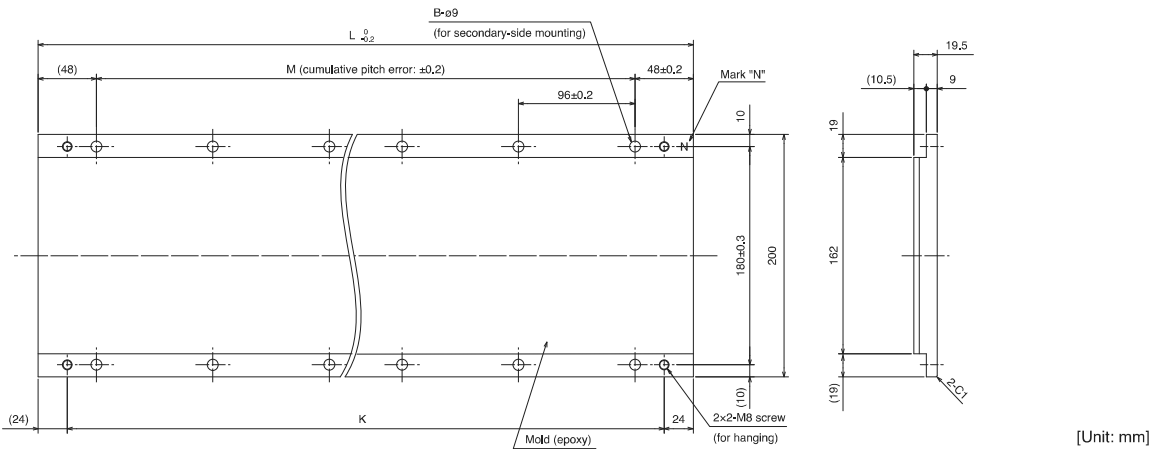
LM-F Series Secondary Side (Magnet) Dimensions

- LM-FS20-480-1SS0
- LM-FS20-576-1SS0



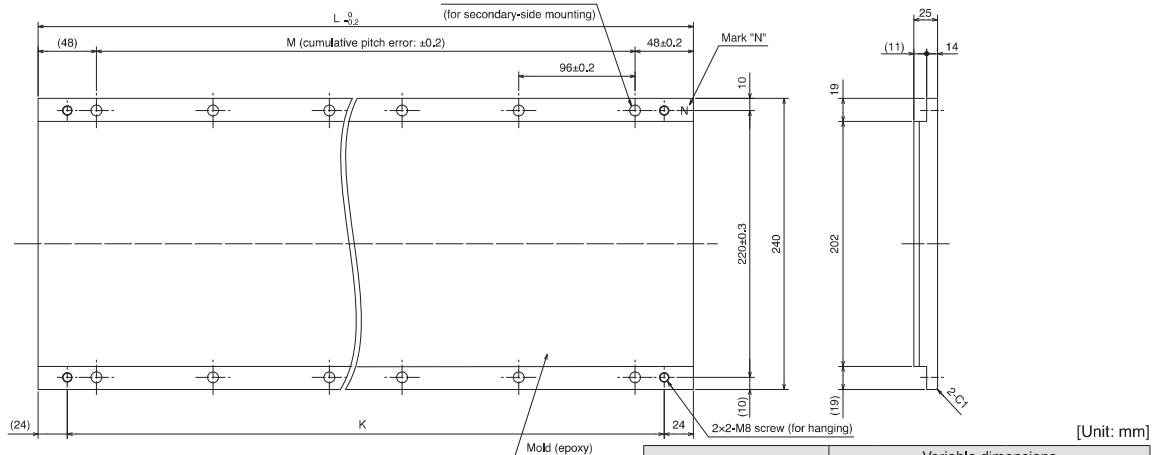
Model	Variable dimensions			
	L	M	B	K
LM-FS20-480-1SS0	480	$4 \times 96 = 384$	2×5	432
LM-FS20-576-1SS0	576	$5 \times 96 = 480$	2×6	528

- LM-FS40-480-1SS0
- LM-FS40-576-1SS0



Model	Variable dimensions			
	L	M	B	K
LM-FS40-480-1SS0	480	$4 \times 96 = 384$	2×5	432
LM-FS40-576-1SS0	576	$5 \times 96 = 480$	2×6	528

- LM-FS50-480-1SS0
- LM-FS50-576-1SS0



Model	Variable dimensions			
	L	M	B	K
LM-FS50-480-1SS0	480	$4 \times 96 = 384$	2×5	432
LM-FS50-576-1SS0	576	$5 \times 96 = 480$	2×6	528

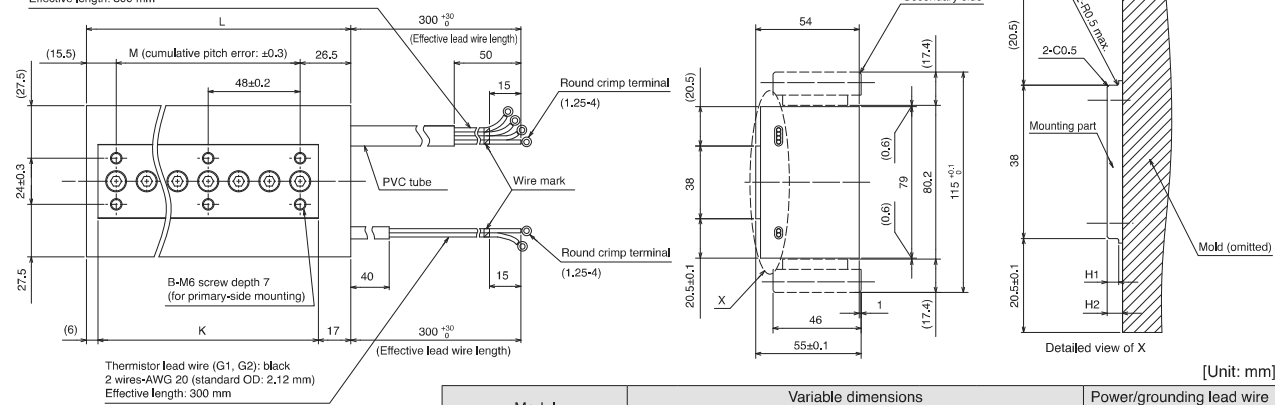
Linear Servo Motors

LM-K2 Series Primary Side (Coil) Dimensions (Note 1, 2)

● LM-K2P1A-01M-2SS1

● LM-K2P1C-03M-2SS1

Power lead wire (U, V, and W): black, Grounding lead wire (E): green/yellow
Effective length: 300 mm



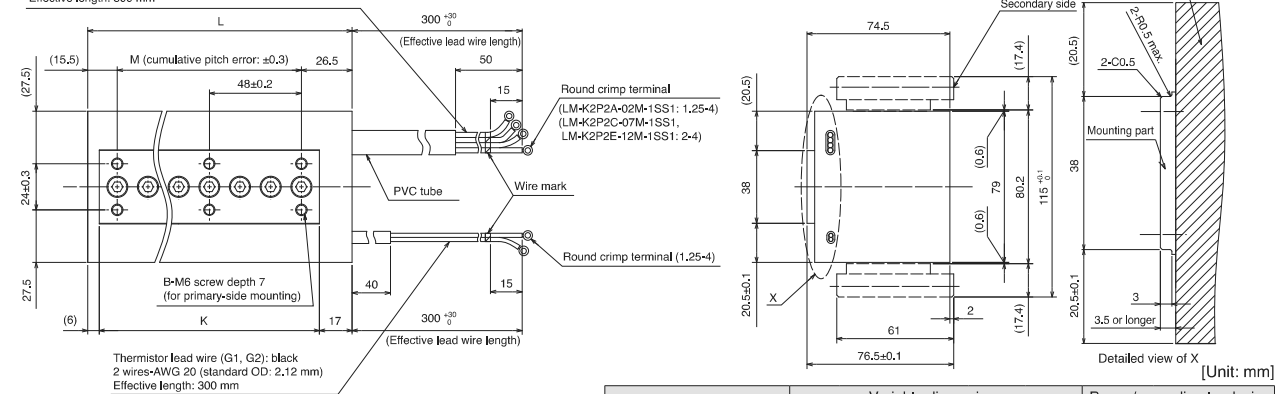
Model	Variable dimensions						Power/grounding lead wire	
	L	M	K	B	H1	H2	Size	Standard OD
LM-K2P1A-01M-2SS1	138	2 × 48 = 96	115	2 × 3	3	3.5 or longer	AWG 20	2.12
LM-K2P1C-03M-2SS1	330	6 × 48 = 288	307	2 × 7	1.5	2.5 or longer	AWG 16	2.7

● LM-K2P2A-02M-1SS1

● LM-K2P2C-07M-1SS1

● LM-K2P2E-12M-1SS1

Power lead wire (U, V, and W): black, Grounding lead wire (E): green/yellow
Effective length: 300 mm

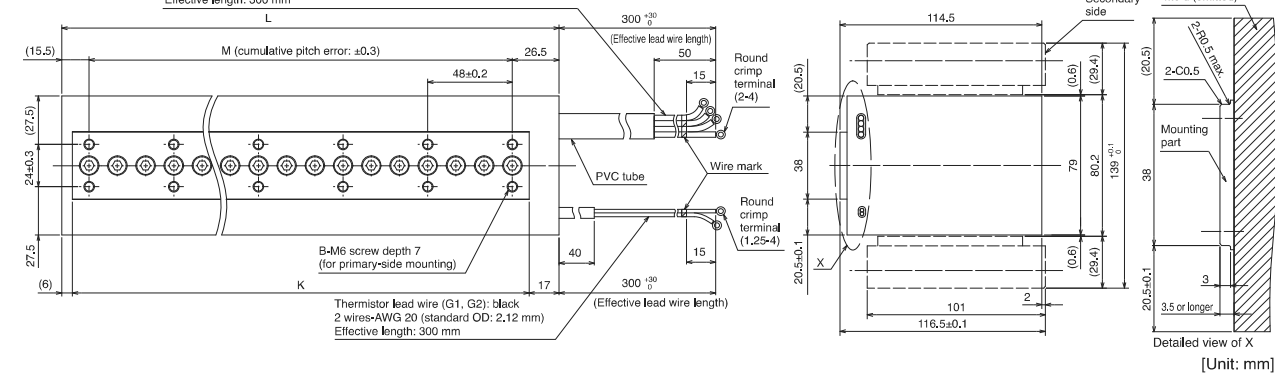


Model	Variable dimensions				Power/grounding lead wire	
	L	M	K	B	Size	Standard OD
LM-K2P2A-02M-1SS1	138	2 × 48 = 96	115	2 × 3	AWG 16	2.7
LM-K2P2C-07M-1SS1	330	6 × 48 = 288	307	2 × 7	AWG 14	3.12
LM-K2P2E-12M-1SS1	522	10 × 48 = 480	499	2 × 11		

● LM-K2P3C-14M-1SS1

● LM-K2P3E-24M-1SS1

Power lead wire (U, V, and W): black, Grounding lead wire (E): green/yellow
Effective length: 300 mm



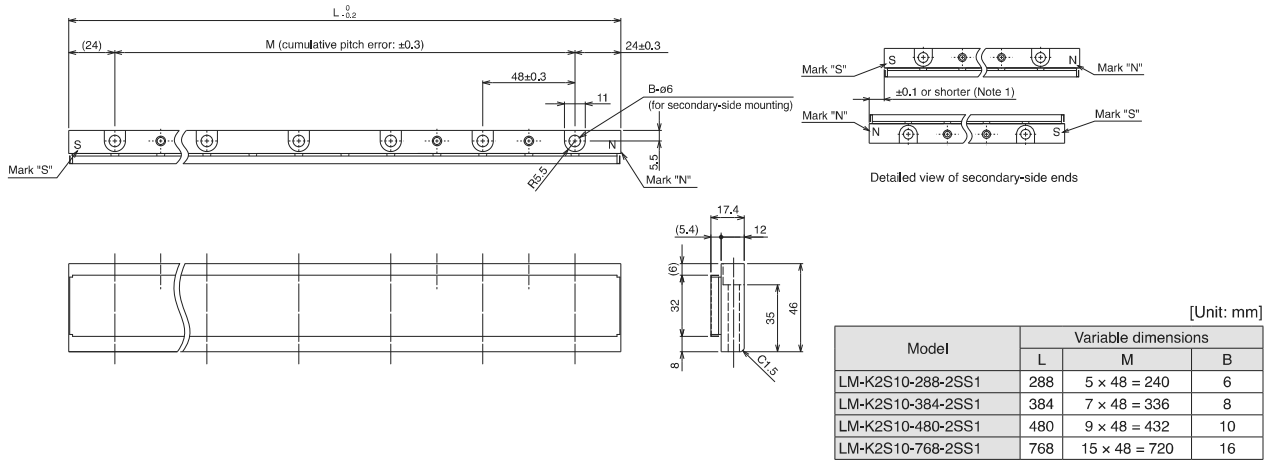
Model	Variable dimensions				Power/grounding lead wire	
	L	M	K	B	Size	Standard OD
LM-K2P3C-14M-1SS1	330	6 × 48 = 288	307	2 × 7	AWG 14	3.12
LM-K2P3E-24M-1SS1	522	10 × 48 = 480	499	2 × 11		

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.

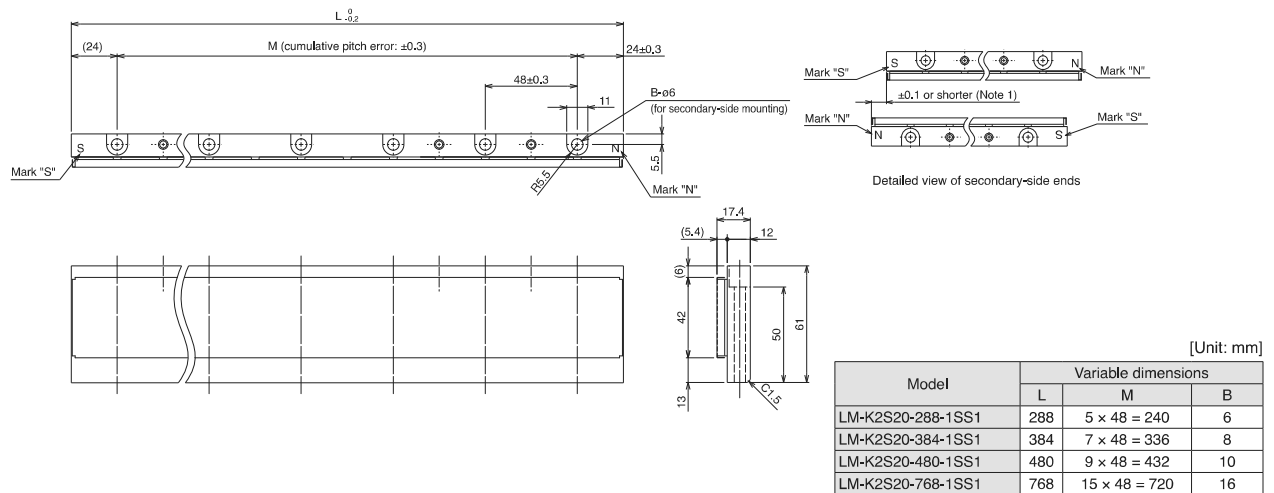
2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-K2 Series Secondary Side (Magnet) Dimensions

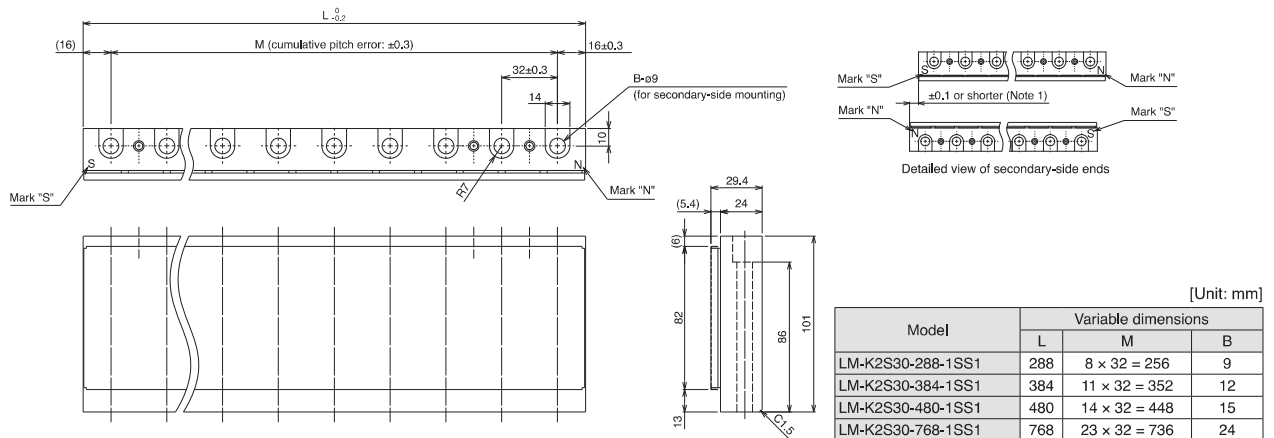
- LM-K2S10-288-2SS1
- LM-K2S10-384-2SS1
- LM-K2S10-480-2SS1
- LM-K2S10-768-2SS1



- LM-K2S20-288-1SS1
- LM-K2S20-384-1SS1
- LM-K2S20-480-1SS1
- LM-K2S20-768-1SS1



- LM-K2S30-288-1SS1
- LM-K2S30-384-1SS1
- LM-K2S30-480-1SS1
- LM-K2S30-768-1SS1



Notes: 1. Longitudinal deviation of the secondary side must be within ±0.1 mm.

Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVSMWires

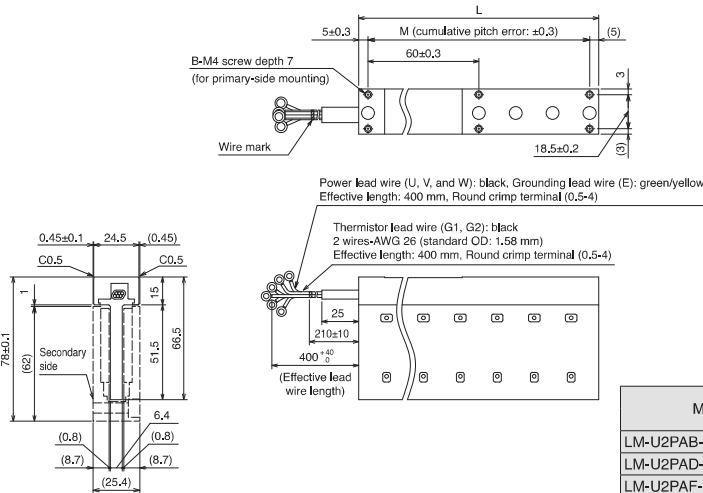
Product List

Cautions

Linear Servo Motors

LM-U2 Series Primary Side (Coil) Dimensions (Note 1, 2)

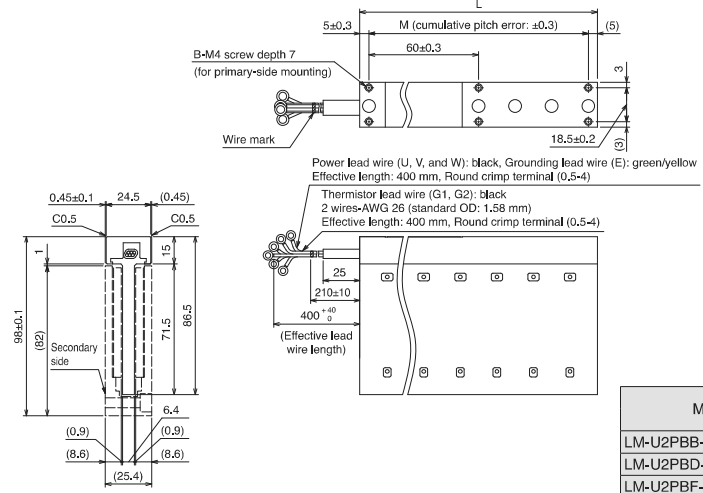
- LM-U2PAB-05M-0SS0 ● LM-U2PAD-10M-0SS0 ● LM-U2PAF-15M-0SS0



[Unit: mm]

Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2PAB-05M-0SS0	130	2 × 60 = 120	2 × 3	AWG 26	1.58
LM-U2PAD-10M-0SS0	250	4 × 60 = 240	2 × 5		
LM-U2PAF-15M-0SS0	370	6 × 60 = 360	2 × 7		

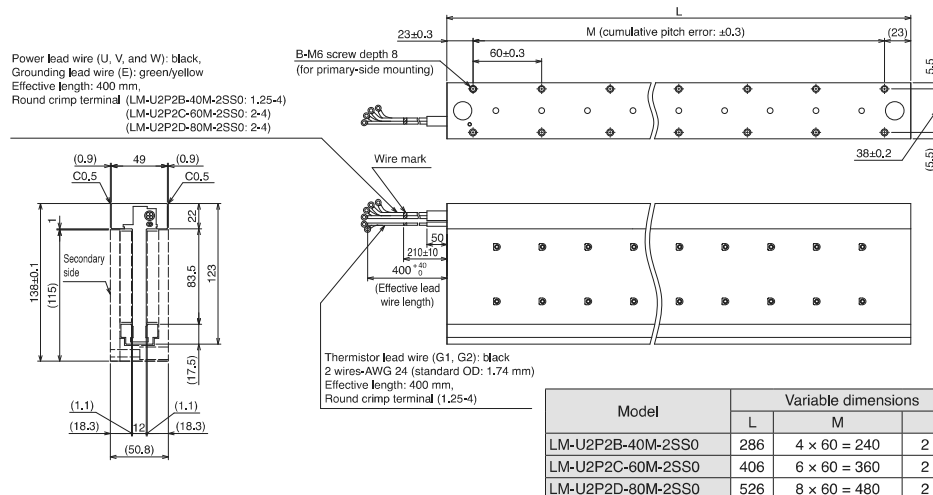
- LM-U2PBB-07M-1SS0 ● LM-U2PBD-15M-1SS0 ● LM-U2PBF-22M-1SS0



[Unit: mm]

Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2PBB-07M-1SS0	130	2 × 60 = 120	2 × 3	AWG 26	1.58
LM-U2PBD-15M-1SS0	250	4 × 60 = 240	2 × 5		
LM-U2PBF-22M-1SS0	370	6 × 60 = 360	2 × 7		

- LM-U2P2B-40M-2SS0 ● LM-U2P2C-60M-2SS0 ● LM-U2P2D-80M-2SS0



[Unit: mm]

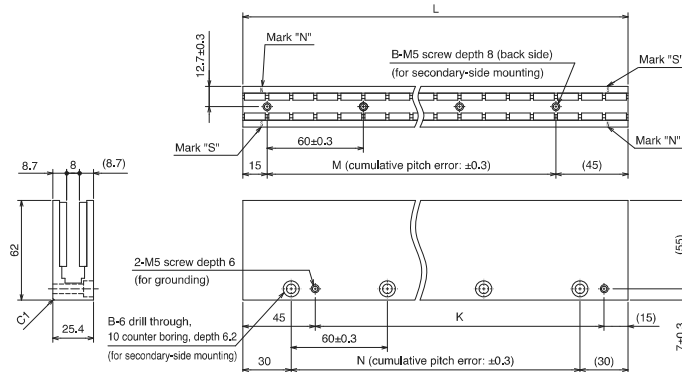
Model	Variable dimensions			Power/grounding lead wire	
	L	M	B	Size	Standard OD
LM-U2P2B-40M-2SS0	286	4 × 60 = 240	2 × 5	AWG 16	2.7
LM-U2P2C-60M-2SS0	406	6 × 60 = 360	2 × 7		
LM-U2P2D-80M-2SS0	526	8 × 60 = 480	2 × 9		

Notes: 1. Power, grounding and thermistor lead wires do not have a long bending life. Fix the lead wires led from the primary side (coil) to a moving part to prevent the lead wires from repetitive bending.

2. Minimum bending radius of the lead wire equals to six times the standard overall diameter of the lead wire.

LM-U2 Series Secondary Side (Magnet) Dimensions

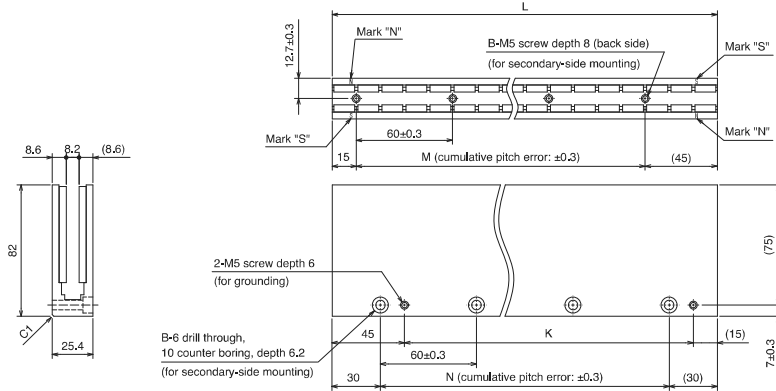
- LM-U2SA0-240-0SS0
- LM-U2SA0-300-0SS0
- LM-U2SA0-420-0SS0



[Unit: mm]

Model	Variable dimensions				
	L	M	B	K	N
LM-U2SA0-240-0SS0	240	3 × 60 = 180	4	180	3 × 60 = 180
LM-U2SA0-300-0SS0	300	4 × 60 = 240	5	240	4 × 60 = 240
LM-U2SA0-420-0SS0	420	6 × 60 = 360	7	360	6 × 60 = 360

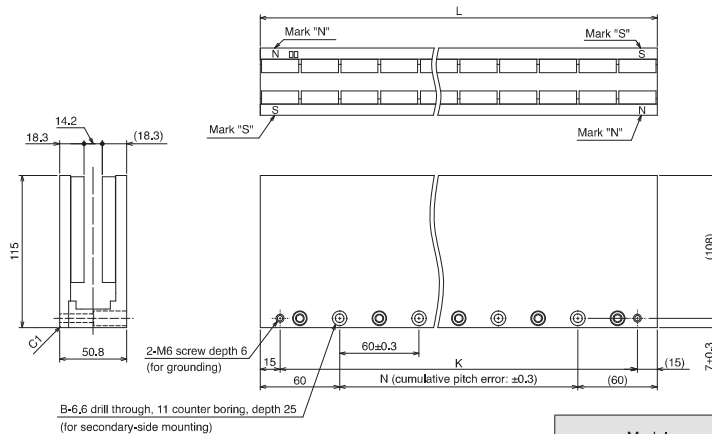
- LM-U2SB0-240-1SS1
- LM-U2SB0-300-1SS1
- LM-U2SB0-420-1SS1



[Unit: mm]

Model	Variable dimensions				
	L	M	B	K	N
LM-U2SB0-240-1SS1	240	3 × 60 = 180	4	180	3 × 60 = 180
LM-U2SB0-300-1SS1	300	4 × 60 = 240	5	240	4 × 60 = 240
LM-U2SB0-420-1SS1	420	6 × 60 = 360	7	360	6 × 60 = 360

- LM-U2S20-300-2SS1
- LM-U2S20-480-2SS1



[Unit: mm]

Model	Variable dimensions			
	L	N	B	K
LM-U2S20-300-2SS1	300	3 × 60 = 180	4	270
LM-U2S20-480-2SS1	480	6 × 60 = 360	7	450

Servo Amplifiers

Rotary Servo Motors

Linear Servo Motors

Direct Drive Motors

Options/Peripheral Equipment

LVS/Wires

Product List

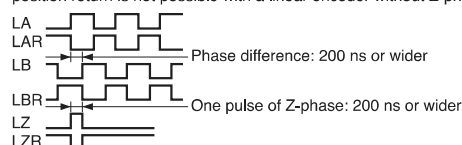
Cautions

Linear Servo Motors

List of Linear Encoders (Note 1)

Linear encoder type		Manufacturer	Model	Resolution	Rated speed (Note 2)	Maximum effective measurement length (Note 3)	Communication method
Mitsubishi Electric serial interface compatible	Absolute type	Magnescale Co., Ltd.	SR77	0.05 μm/0.01 μm	3.3 m/s	2040 mm	Two-wire type
			SR87			3040 mm	
			SR27A	0.01 μm	3.3 m/s	2040 mm	Two-wire type/ Four-wire type (Note 4)
			SR67A			3640 mm	
			SmartSCALE SQ47	0.005 μm	3.3 m/s	3740 mm	
			SmartSCALE SQ57			3770 mm	
		Mitutoyo Corporation	AT343A	0.05 μm	2.0 m/s	3000 mm	Two-wire type
			AT543A-SC			2200 mm	
			AT545A-SC	20 μm/4096 (Approx. 0.005 μm)	2.5 m/s	2200 mm	
			ST741A	0.5 μm	4.0 m/s	6000 mm	
			ST742A				
			ST743A				
			ST744A				
			ST748A	0.1 μm	4.0 m/s	6000 mm	
		ST1341A	0.01 μm				4.0 m/s
		ST1342A	0.001 μm	4200 mm			
		Renishaw	RESOLUTE RL40M	1 nm/50 nm	4.0 m/s	10000 mm	Two-wire type
			EVOLUTE EL40M	50 nm/100 nm/500 nm	4.0 m/s	3020 mm	
	Heidenhain	LC 495M	0.001 μm/0.01 μm	3.0 m/s	2040 mm	Four-wire type (Note 4)	
		LC 195M			4240 mm		
		LIC 4193M	0.005 μm/0.01 μm	4.0 m/s	3040 mm	Two-wire type/ Four-wire type (Note 4)	
		LIC 4195M			28440 mm		
		LIC 4197M			6040 mm		
		LIC 4199M			1020 mm		
		LIC 2197M	0.05 μm/0.1 μm	4.0 m/s	6020 mm		
		LIC 2199M			6020 mm		
	Incremental type	Magnescale Co., Ltd.	SR75	0.05 μm/0.01 μm	3.3 m/s	2040 mm	Two-wire type
SR85			3040 mm				
SL710 + PL101-RM/RHM			0.1 μm	4.0 m/s	100000 mm	Two-wire type/ Four-wire type (Note 4)	
SQ10 + PQ10 + MQ10			0.1 μm/0.05 μm	10.0 m/s	3800 mm		
Heidenhain		LIDA 483	+ EIB 392M (/16384)	20 μm/16384 (Approx. 1.22 nm)	4.0 m/s	3040 mm	Four-wire type (Note 4)
		LIDA 485				30040 mm	
		LIDA 487				6040 mm	
		LIDA 489				1020 mm	
		LIDA 287	+ EIB 392M (/16384)	200 μm/16384 (Approx. 12.2 nm)	4.0 m/s	10000 mm	
		LIDA 289					
	LIF 481	+ EIB 392M (/4096)	4 μm/4096 (Approx. 0.977 nm)	1.2 m/s	1020 mm		
LIP 581	1440 mm						
Nidec Sankyo Corporation	PSLH041 (Note 7)	0.1 μm	5.0 m/s	2400 mm	Two-wire type		
A/B/Z-phase differential output type (Note 5, 8)	Not designated	-	0.001 μm to 5 μm (Note 6)	Depends on the linear encoder	Depends on the linear encoder	A/B/Z-phase differential output method	

- Notes: 1. Contact the relevant linear encoder manufacturer for details on operating environment and specifications of the linear encoder such as ambient temperature, vibration resistance and IP rating.
2. The rated speed of the linear encoder is applicable when the linear encoder is used with MR-J4 series servo amplifier. The values may differ from the manufacturers' specifications.
3. The length is specified by the linear encoder manufacturers. The maximum length of the encoder cable between linear encoder and servo amplifier is 30 m.
4. When using the four-wire type linear encoder in fully closed loop control system, use MR-J4-GF-RJ/MR-J4-B-RJ/MR-J4-A-RJ servo amplifier. When using four-wire type linear encoder with the scale measurement function, use MR-J4-GF-RJ/MR-J4-B-RJ servo amplifier.
5. When using the A/B/Z-phase differential output type linear encoder, use MR-J4-GF-RJ/MR-J4-B-RJ/MR-J4-A-RJ servo amplifier.
6. Select the linear encoder within this range.
7. Use MR-J4-B-RJ/MR-J4W-B/MR-J4-A-RJ servo amplifier with software version B3 or later.
8. Output A-phase, B-phase, and Z-phase signals in the differential line driver. The phase difference of the A-phase pulse and the B-phase pulse, and the width of the Z-phase pulse must be 200 ns or wider. The output pulse of A-phase and B-phase of the A/B/Z-phase differential output linear encoder is in the multiply-by-four count method. Home position return is not possible with a linear encoder without Z-phase.



Selecting Linear Servo Motor

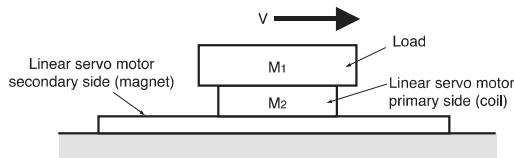
- Linear servo motor must be selected according to the purpose of the application. Select the optimal linear servo motor after completely understanding the characteristics of the guides, the linear encoders and the linear servo motors.
- The maximum speed of LM-H3 series is 3.0 m/s and of LM-F, LM-K2 and LM-U2 series is 2.0 m/s. Note that the maximum speed may not be reached, depending on the selected linear encoder.

Linear Servo Motor Sizing Example

● In order to select a suitable linear servo motor, it is necessary to calculate the maximum thrust required during acceleration/deceleration and the continuous effective load thrust according to the machine specifications and the operating patterns. Here the linear servo motor is selected according to linear acceleration/deceleration operating patterns.

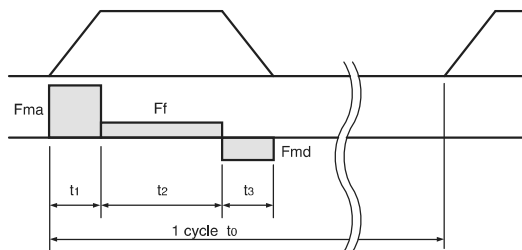
1. Selection criteria

(1) Configurations



Load mass	$M_1 = 20 \text{ kg}$
Linear servo motor primary-side (coil) mass (Determined after the motor is selected.)	$M_2 = \text{ kg}$
Acceleration	$a = 14.4 \text{ m/s}^2$
Deceleration	$d = 14.4 \text{ m/s}^2$
Resistive force (including friction, unbalance and cable chain) (Determined after the motor is selected.)	$F_f = \text{ N}$
Feed speed	$V = 1.8 \text{ m/s}$
Operating cycle	$t_0 = 2 \text{ s}$
Acceleration time	$t_1 = 0.125 \text{ s}$
Constant velocity time	$t_2 = 0.75 \text{ s}$
Deceleration time	$t_3 = 0.125 \text{ s}$
Mechanical efficiency	$\eta = 1.0$
Friction coefficient	$\mu = 0.020 \text{ (for iron)}$

(2) Operating pattern



2. Method of selecting linear servo motor (theoretical value)

(1) Select a linear servo motor

From the linear servo motor series that is suitable for your application or machine, select a linear servo motor with the mass ratio of load to primary side (coil) which is equal to or less than the recommended load to motor mass ratio.

For LM-H3 series: $35 \text{ times}^{(\text{Note } 1)} \geq M_1/M_2$

Select linear servo motors that satisfy the above formula, e.g., LM-H3P2A-07P-BSS0, LM-H3P3A-12P-CSS0, and LM-H3P3B-24P-CSS0.

Calculate thrusts during acceleration and deceleration, and continuous effective load thrust for each linear servo motor selected in (1).

The following is an example of calculation for LM-H3P3B-24P-CSS0.

(2) Calculate necessary thrust

Resistive force

$$M = M_1 + M_2 = 22.3 \text{ kg}$$

$$F_f = \mu \cdot (M \cdot 9.8 + \text{Magnetic attraction force [N]}) \text{ (when considering friction only)} = 48.4 \text{ N}$$

Thrust during acceleration and deceleration

$$F_{ma} = M \cdot a + F_f = 369.5 \text{ N}$$

$$F_{md} = -M \cdot d + F_f = -272.7 \text{ N}$$

Continuous effective load thrust

$$F_{rms} = \sqrt{(F_{ma}^2 \cdot t_1 + F_f^2 \cdot t_2 + F_{md}^2 \cdot t_3) / t_0} = 118.6 \text{ N}$$

(3) Verify the selected linear servo motor.

$$F_{rms} / \eta \leq \text{Continuous thrust [N] of the selected linear servo motor}$$

$$F_{ma} / \eta \leq \text{Maximum thrust [N] of the selected linear servo motor}$$

If the above criteria are not satisfied, select one rank larger capacity linear servo motor and recalculate.

(4) Result

Select the following:

Linear servo motor: LM-H3P3B-24P-CSS0

Servo amplifier: MR-J4-70B

Notes: 1. The ratio of 35 times is applicable for LM-H3 series. Select a linear servo motor with the mass ratio of 30 times or less for LM-K2 or LM-U2 series, and 15 times or less for LM-F series.

[Free capacity selection software]

Capacity selection software (MRZJW3-MOTSZ111E) does all the calculations for you. The capacity selection software is available for free download. Contact your local sales office for more details.

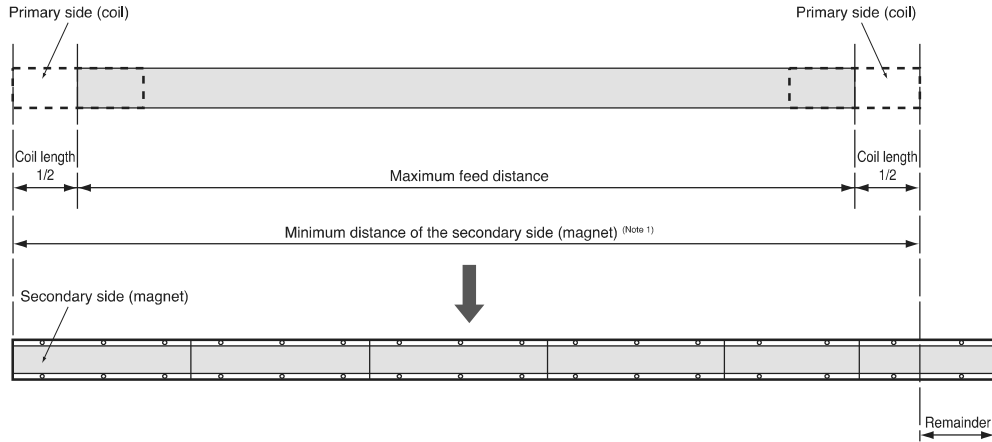
* Be sure to update your MRZJW3-MOTSZ111E to the latest version.

Linear Servo Motors

3. Determining the number of the secondary-side (magnet) blocks

The number of the secondary-side (magnet) blocks is determined according to the total distance calculated from the following equation (Note 2) :

$$(\text{Total length of aligned secondary side (magnet)}) \geq (\text{Maximum feed distance}) + (\text{Length of the primary side (coil)})$$



- Notes: 1. Keep the cumulative pitch error of the mounting screw holes within ± 0.2 mm. When two or more secondary sides (magnets) are aligned, spaces may exist between each secondary side (magnet) block, depending on the mounting method and the number of the secondary-side blocks.
 2. LM-K2 series has a structure of magnetic attraction counter-force and requires at least two blocks of identical secondary side (magnet). Therefore, the total number of the secondary side necessary equals to twice the number determined from the equation.

4. Selecting regenerative option

The following table shows the energy charged into the capacitor of the servo amplifier and the inverse efficiency of the linear servo motor.

The energy consumed by a regenerative resistor is calculated as follows:

$$\text{Regenerative energy } P [W] = \{-Fmd \cdot (t_s \cdot \text{Speed}/2) \cdot (\text{Inverse efficiency}/100) - \text{Capacitor charging}\}/t_0$$

Select a suitable regenerative option as necessary to keep the consumed regenerative energy below the regenerative power shown in the following table:

Servo Amplifier (Note 2)	Capacitor charging [J]	Inverse efficiency [%]	Permissible regenerative power of built-in regenerative resistor [W]	Permissible regenerative power of external regenerative resistor (standard accessory) [W] (Note 4)	Permissible regenerative power of regenerative option [W]											
					MR-RB (Note 3)											
					032	12	30	3N	31	32	50 (Note 1)	5N (Note 1)	51 (Note 1)	5R (Note 4)	9F (Note 4)	6K-4 (Note 4)
MR-J4-20_(-RJ) MR-J4-20_1(-RJ)	9	75	10	-	30	100	-	-	-	-	-	-	-	-	-	-
MR-J4-40_(-RJ) MR-J4-40_1(-RJ)	11	85	10	-	30	100	-	-	-	-	-	-	-	-	-	-
MR-J4-60_(-RJ)	11	85	10	-	30	100	-	-	-	-	-	-	-	-	-	-
MR-J4-70_(-RJ)	18	85	20	-	30	100	-	-	-	300	-	-	-	-	-	-
MR-J4-200_(-RJ)	36	85	100	-	-	-	300	-	-	-	500	-	-	-	-	-
MR-J4-350_(-RJ)	40	85	100	-	-	-	300	-	-	-	500	-	-	-	-	-
MR-J4-500_(-RJ)	45	90	130	-	-	-	-	300	-	-	-	500	-	-	-	-
MR-J4-700_(-RJ)	70	90	170	-	-	-	-	300	-	-	-	500	-	-	-	-
MR-J4-11K_(-RJ)	120	90	-	500 (800)	-	-	-	-	-	-	-	-	500 (800)	-	-	-
MR-J4-15K_(-RJ)	170	90	-	850 (1300)	-	-	-	-	-	-	-	-	-	850 (1300)	-	-
MR-J4-22K_4(-RJ)	250	90	-	850 (1300)	-	-	-	-	-	-	-	-	-	-	-	850 (1300)

- Notes: 1. Be sure to cool the unit forcibly with a cooling fan (92 mm x 92 mm, minimum air flow: 1.0 m³/min). The cooling fan must be prepared by user.
 2. For selecting a regenerative option for MR-J4W_-B, refer to "MR-J4W2_-B MR-J4W3_-B MR-J4W2-0303B6 Servo Amplifier Instruction Manual" for details.
 3. Refer to "Regenerative Option" in this catalog for details on the regenerative option.
 4. The value in brackets is applicable when cooling fans (two units of 92 mm x 92 mm, minimum air flow: 1.0 m³/min) are installed, and then [Pr. PA02] is changed.