



Changes for the Better

LINEAR SERVO AMPLIFIERS & MOTORS
FOR MELSERVO-J3 SERIES

Always Ahead of the Scene, Seize the Future

LINEAR SERVO

LM Series



Mitsubishi Electric Corporation Nagoya Works is a factory certified for ISO14001 (standards for environmental management systems) and ISO9001(standards for quality assurance management systems)

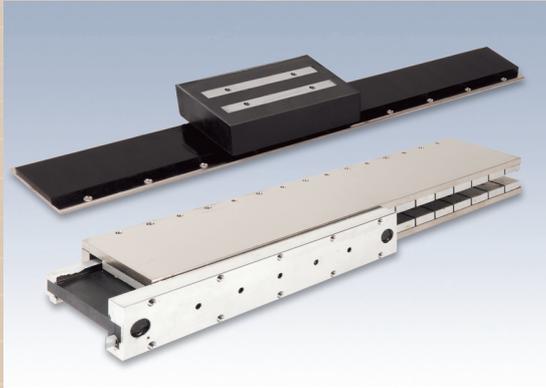
**Empowering
Industries**



Always Ahead of the Scene, Seize

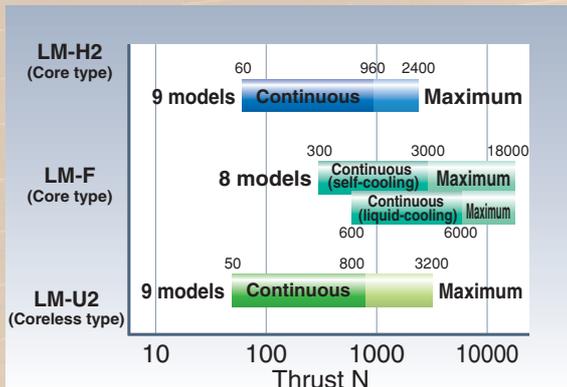
Linear Servo Features

1 Achieving high speeds and high accuracies



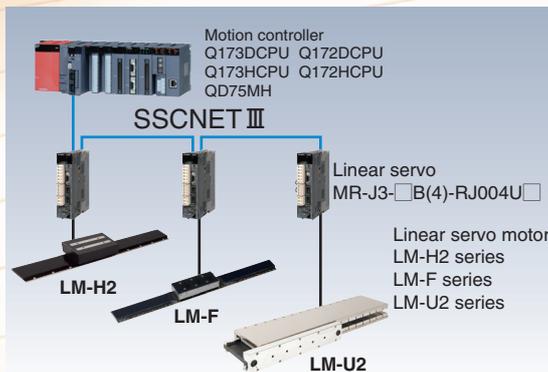
- Linear servo motors can attain high rigidity since they are direct drive systems. The fully closed system realizes high accuracy operation.
- High speed operation (2m/s) is now possible. (Conventional transmission mechanisms had difficulty realizing such fast operational speeds.)

2 Core type and coreless type



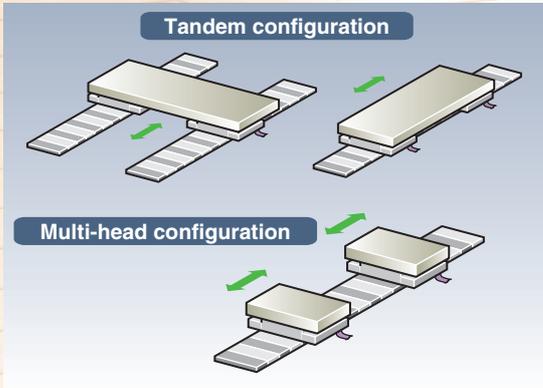
- The LM-H2 series and LM-F series (liquid-cooling type) realize large thrust in a compact size. These models are applicable for a variety of systems from chip mounters to material handling systems.
- The LM-U2 series is coreless and also compatible with large thrust applications. This model is suitable for diverse systems which require operation with no thrust fluctuation, such as printing machines or inspection systems.

3 Compatible with high-performance servo amplifier MR-J3-B



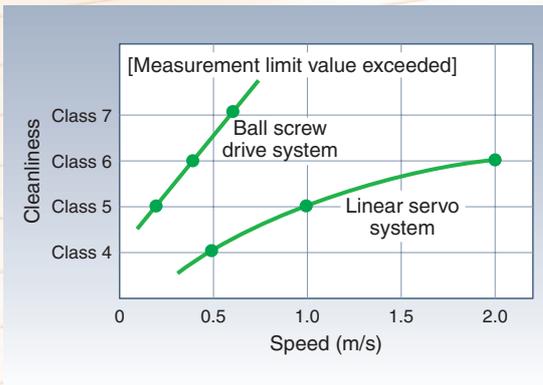
- Highly accurate synchronous operation and multi-head operation can be easily configured when used in combination with the SSCNET III compatible motion controller Q-series.
- Compatibility with the MR-J3-B series allows high-response and high-accuracy systems with improved reliability to be configured.
- The MR-J3-B "robust disturbance compensation function" suppresses the offsets of disturbances that can cause uneven speeds.

4 Ideal for multi-head systems



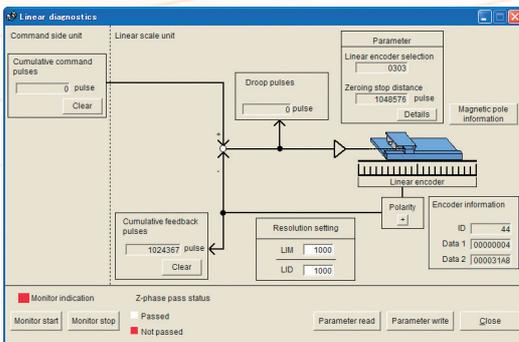
- The tandem configuration is useful for large systems which require highly accurate synchronization between two axes.
- The multi-head configuration allows two movable motor coils (primary side coils) to be controlled with independent commands, simplifying the machine structure. This is best suited for systems which require shorter tact times.

5 Eco-friendly and perfect for clean applications



- Use in clean environments is possible since no ball screws are used and therefore contamination from grease is not an issue.
- Elimination of transmission mechanisms which include backlash, enables smooth and quiet operation even at high speeds.

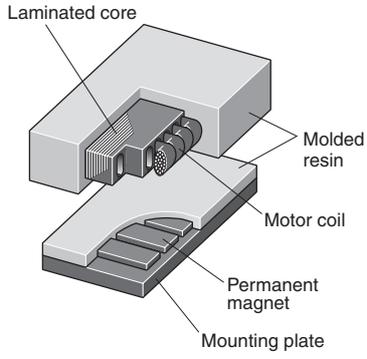
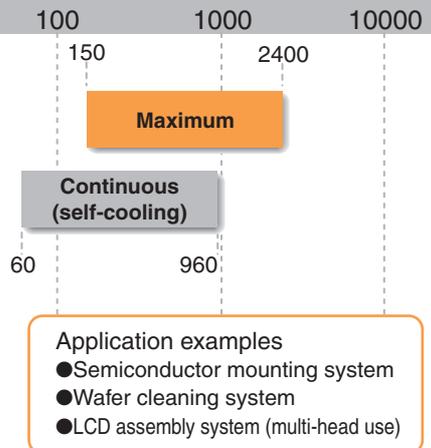
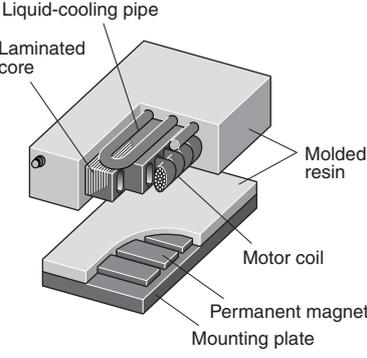
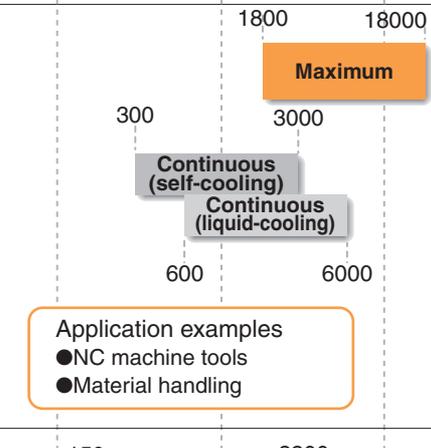
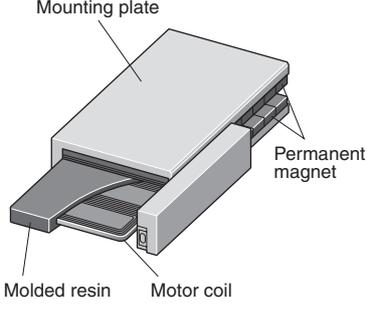
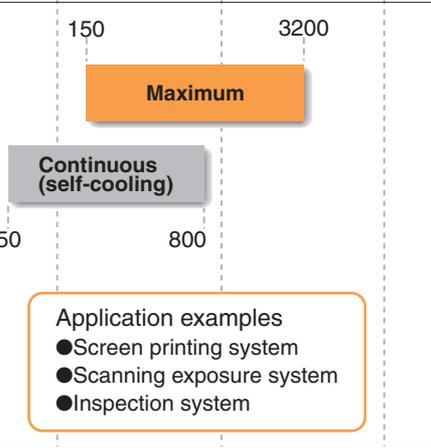
6 Setup software-MR Configurator



- Parameter setting, gain adjustment, monitoring, diagnosis and test operation can be carried out easily with MR Configurator (setup software).
- The advanced auto-tuning function and machine analyzer function allow the linear servo to be appropriately adjusted and reduces system startup time.

LINEAR SERVO LM series

Linear servo motor series

Motor series		Thrust range (N)			Features	
Core type	LM-H2 Series 	100	1000	10000	Structure <ul style="list-style-type: none"> ●The motor consists of the primary side (laminated core + motor coil) and the secondary side (permanent magnets + mounting plate). ●The primary side has slots on the laminated core. The motor coil is wound on this laminated core, and the entire section is molded by resin. ●The secondary side has flat permanent magnets positioned and fixed on the mounting plate. The entire section is molded by resin. 	
		150	2400	60	960	Features <ul style="list-style-type: none"> ●The thrust/volume ratio can be increased, allowing space-savings. (High thrust density) ●The attraction force functions as the pre-load on the guide, allowing high-rigidity to be attained.
	Application examples <ul style="list-style-type: none"> ●Semiconductor mounting system ●Wafer cleaning system ●LCD assembly system (multi-head use) 					
Core type	LM-F Series 		1800	18000	Structure <ul style="list-style-type: none"> ●The basic structure is the same as the LM-H2 series. However, LM-F series has a liquid-cooling pipe in the primary side to suppress heat generation. 	
		300	3000	600	6000	Features <ul style="list-style-type: none"> ●By circulating cooling liquid at 5 liter/min, the continuous thrust can be twice as much as that of self-cooling.
	Application examples <ul style="list-style-type: none"> ●NC machine tools ●Material handling 					
Coreless type	LM-U2 Series 	150	3200		Structure <ul style="list-style-type: none"> ●The motor consists of the primary side (motor coil) and the secondary side (permanent magnets + mounting plate). ●The primary side does not have a laminated core. The motor coil is accurately positioned on the base and molded by resin. ●On the secondary side, permanent magnets are accurately positioned and fixed to face each other in a U-shaped like mounting plate. 	
		150	3200	50	800	Features <ul style="list-style-type: none"> ●Speed fluctuations are very small due to elimination of magnetic attraction force and cogging. ●The guide life can be extended as there is no attraction force.
	Application examples <ul style="list-style-type: none"> ●Screen printing system ●Scanning exposure system ●Inspection system 					

Model configurations for linear servo motor

●LM-H2 Series

LM-H2P2B-24M-□ (Primary side: Coil)

Symbol	Length (nominal dimension)
A	128mm
B	224mm
C	320mm
D	416mm

Symbol	Width (nominal dimension)
1	50mm
2	70mm
3	110mm

Symbol	Maximum speed
M	2m/s

Symbol	Rated thrust
06	60N
12	120N
24	240N
36	360N
48	480N
72	720N
96	960N

Symbol	Motor model
4SS0	LM-H2P1A-06M
	LM-H2P2A-12M
	LM-H2P2B-24M
	LM-H2P2C-36M
1SS0	LM-H2P2D-48M
	LM-H2P3A-24M
	LM-H2P3B-48M
	LM-H2P3C-72M
	LM-H2P3D-96M

LM-H2S20-288-□ (Secondary side: Magnet)

Symbol	Width (nominal dimension)
1	42mm
2	65mm
3	105mm

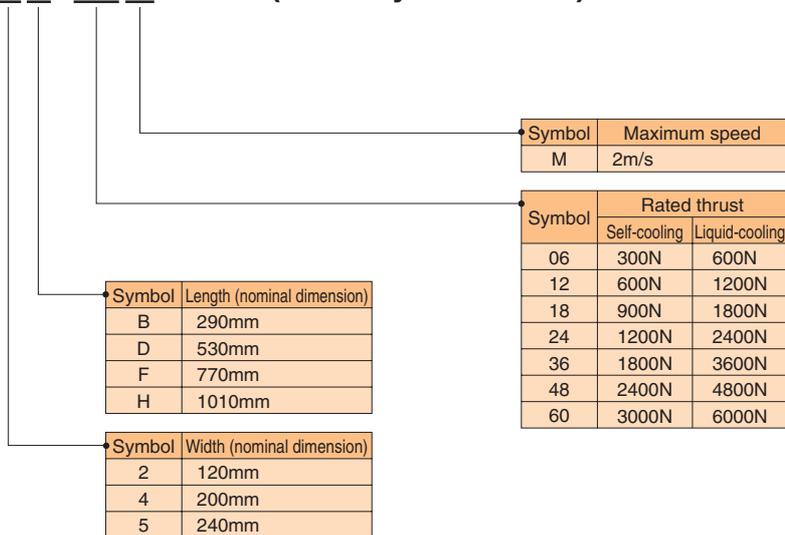
Symbol	Length (nominal dimension)
288	288mm
384	384mm
480	480mm
768	768mm

Symbol	Motor model
4SS0	LM-H2S10-288
	LM-H2S10-384
	LM-H2S10-480
	LM-H2S10-768
1SS0	LM-H2S20-288
	LM-H2S20-384
	LM-H2S20-480
	LM-H2S20-768
	LM-H2S30-288
	LM-H2S30-384
	LM-H2S30-480
	LM-H2S30-768

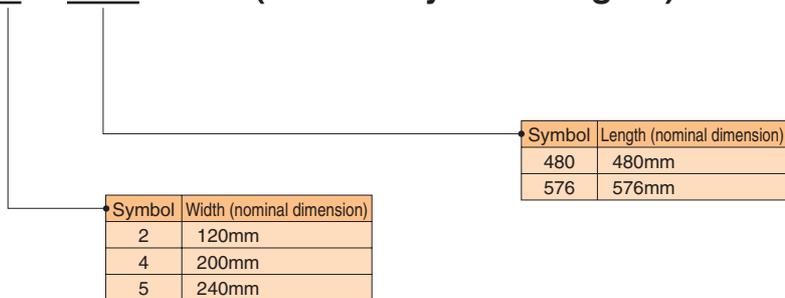
Model configurations for linear servo motor

● LM-F Series

LM - FP 2 B - 06 M - 1SS0 (Primary side: Coil)

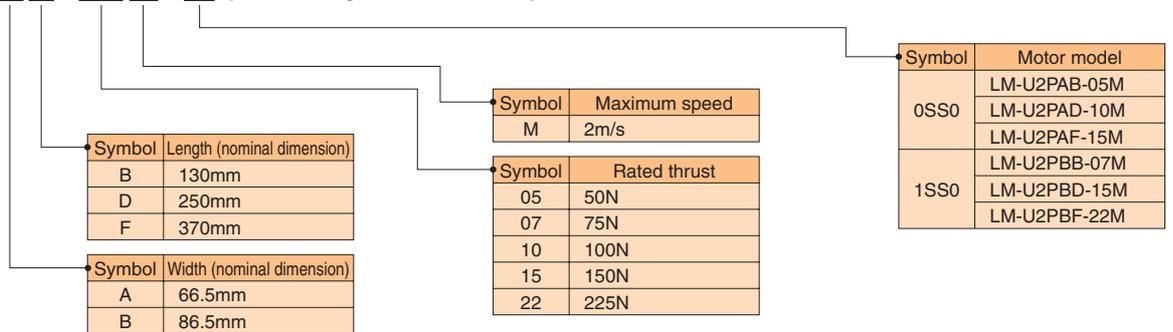


LM - FS 20 - 480 - 1SS0 (Secondary side: Magnet)

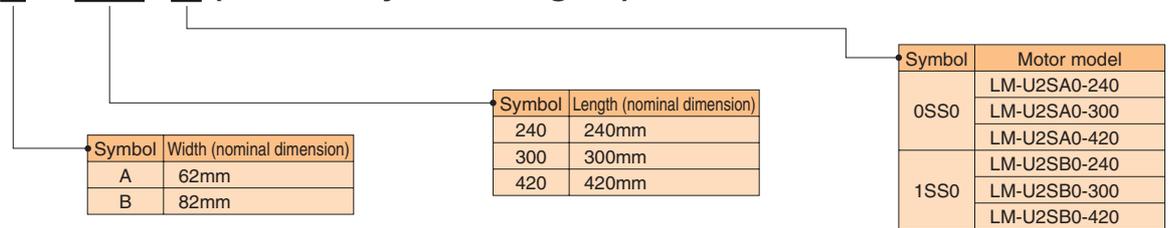


●LM-U2 (medium thrust) Series

LM-U2PAB-05M-□ (Primary side: Coil)

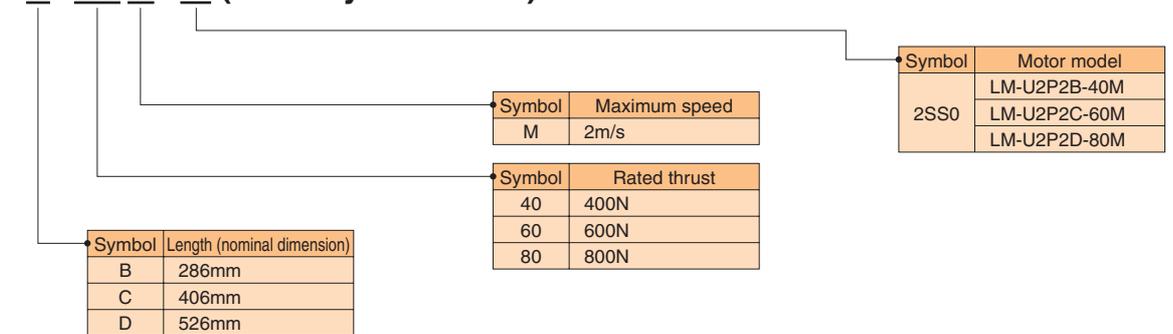


LM-U2SA0-240-□ (Secondary side: Magnet)



●LM-U2 (large thrust) Series

LM-U2P2B-40M-□ (Primary side: Coil)



LM-U2S20-480-□ (Secondary side: Magnet)



LINEAR SERVO LM series

Model configurations for servo amplifier

MR-J3-40B - **RJ004U**

MELSERVO
-J3 Series

Compatible with linear servo motor

Symbol	Power supply
None	3-phase 200VAC
4	3-phase 400VAC

SSCNET III compatible

Servo amplifier model
20, 40, 60, 70, 200, 350, 500, 700, 11K, 15K, 22K (Note 1)

Notes: 1. Only 22K is compatible with 3-phase 400VAC.

Symbol for compatible linear servo motor
Refer to the following "Combination of linear servo motor and servo amplifier".

Combination of linear servo motor and servo amplifier

Linear servo motor		Servo amplifier	
Primary side (coil)	Secondary side (magnet)		
LM-H2 series	LM-H2P1A-06M-4SS0	LM-H2S10-288-4SS0, LM-H2S10-384-4SS0, LM-H2S10-480-4SS0, LM-H2S10-768-4SS0	MR-J3-40B-RJ004U500
	LM-H2P2A-12M-1SS0	LM-H2S20-288-1SS0, LM-H2S20-384-1SS0, LM-H2S20-480-1SS0, LM-H2S20-768-1SS0	MR-J3-40B-RJ004U501
	LM-H2P2B-24M-1SS0		MR-J3-70B-RJ004U502
	LM-H2P2C-36M-1SS0		MR-J3-200B-RJ004U503
	LM-H2P2D-48M-1SS0		MR-J3-200B-RJ004U504
	LM-H2P3A-24M-1SS0	LM-H2S30-288-1SS0, LM-H2S30-384-1SS0, LM-H2S30-480-1SS0, LM-H2S30-768-1SS0	MR-J3-70B-RJ004U505
	LM-H2P3B-48M-1SS0		MR-J3-200B-RJ004U506
	LM-H2P3C-72M-1SS0		MR-J3-350B-RJ004U507
LM-H2P3D-96M-1SS0	MR-J3-500B-RJ004U508		
LM-F series	LM-FP2B-06M-1SS0	LM-FS20-480-1SS0, LM-FS20-576-1SS0	MR-J3-200B-RJ004U518 (for self-cooling) MR-J3-200B-RJ004U519 (for liquid-cooling)
	LM-FP2D-12M-1SS0		MR-J3-500B-RJ004U520 (for self-cooling) MR-J3-500B-RJ004U521 (for liquid-cooling)
	LM-FP2F-18M-1SS0		MR-J3-700B-RJ004U522 (for self-cooling) MR-J3-700B-RJ004U523 (for liquid-cooling)
	LM-FP4B-12M-1SS0	LM-FS40-480-1SS0, LM-FS40-576-1SS0	MR-J3-500B-RJ004U524 (for self-cooling) MR-J3-500B-RJ004U525 (for liquid-cooling)
	LM-FP4D-24M-1SS0		MR-J3-700B-RJ004U526 (for self-cooling) MR-J3-700B-RJ004U527 (for liquid-cooling)
	LM-FP4F-36M-1SS0		MR-J3-11KB-RJ004U528 (for self-cooling) MR-J3-11KB-RJ004U529 (for liquid-cooling)
	LM-FP4H-48M-1SS0		MR-J3-15KB-RJ004U530 (for self-cooling) MR-J3-15KB-RJ004U531 (for liquid-cooling)
	LM-FP5H-60M-1SS0	LM-FS50-480-1SS0, LM-FS50-576-1SS0	MR-J3-22KB4-RJ004U532 (for self-cooling) (Note 1) MR-J3-22KB4-RJ004U533 (for liquid-cooling) (Note 1)
LM-U2 series	LM-U2PAB-05M-0SS0	LM-U2SA0-240-0SS0, LM-U2SA0-300-0SS0, LM-U2SA0-420-0SS0	MR-J3-20B-RJ004U512
	LM-U2PAD-10M-0SS0		MR-J3-40B-RJ004U513
	LM-U2PAF-15M-0SS0		MR-J3-40B-RJ004U514
	LM-U2PBB-07M-1SS0	LM-U2SB0-240-1SS0, LM-U2SB0-300-1SS0, LM-U2SB0-420-1SS0	MR-J3-20B-RJ004U515
	LM-U2PBD-15M-1SS0		MR-J3-60B-RJ004U516
	LM-U2PBF-22M-1SS0		MR-J3-70B-RJ004U517
	LM-U2P2B-40M-2SS0		MR-J3-200B-RJ004U509
	LM-U2P2C-60M-2SS0	LM-U2S20-300-2SS0, LM-U2S20-480-2SS0	MR-J3-350B-RJ004U510
LM-U2P2D-80M-2SS0	MR-J3-500B-RJ004U511		

Notes: 1. These servo amplifiers, MR-J3-22KB4-RJ004U , are rated 400VAC. 200VAC class is not available.

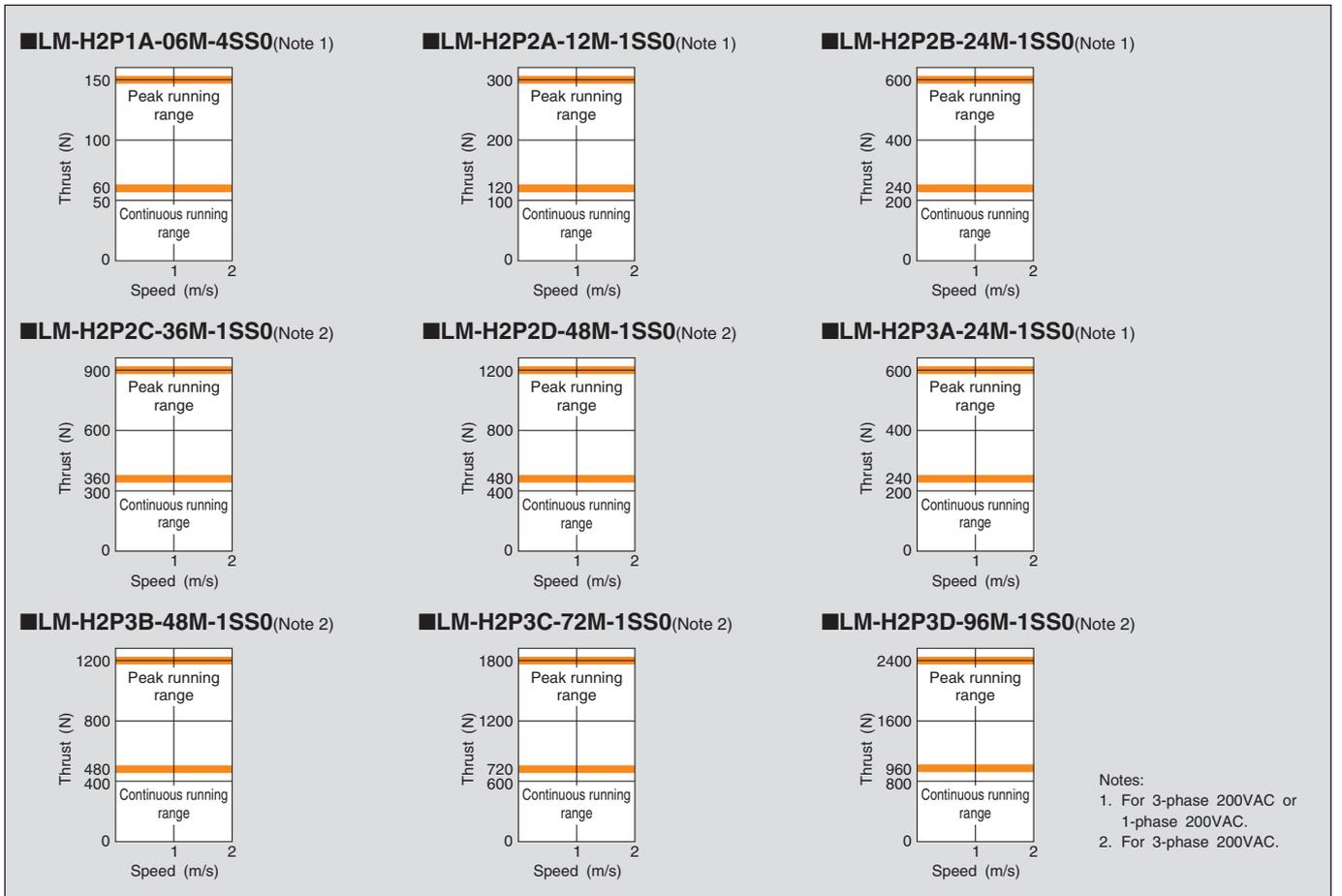
Linear servo motor specifications

●LM-H2 Series

Linear servo motor model	LM-H2	P1A-06M-4SS0	P2A-12M-1SS0	P2B-24M-1SS0	P2C-36M-1SS0	P2D-48M-1SS0	P3A-24M-1SS0	P3B-48M-1SS0	P3C-72M-1SS0	P3D-96M-1SS0
Amplifier model	MR-J3-	40B-RJ004U500	40B-RJ004U501	70B-RJ004U502	200B-RJ004U503	200B-RJ004U504	70B-RJ004U505	200B-RJ004U506	350B-RJ004U507	500B-RJ004U508
Power facility capacity (kVA)		0.9	0.9	1.3	3.5	3.5	1.3	3.5	5.5	7.5
Cooling method		Self-cooling								
Thrust	Continuous (N)	60	120	240	360	480	240	480	720	960
	Maximum (N)	150	300	600	900	1200	600	1200	1800	2400
Maximum speed (m/s)(Note 1)		2.0								
Magnetic attraction force (N)		500	1000	1900	2700	3500	2000	3700	5300	7000
Mass (kg [lb])	Primary side (coil)	0.9 (2.0)	1.4 (3.1)	2.5 (5.6)	3.6 (8.0)	4.7 (11)	2.4 (5.3)	4.3 (9.5)	6.2 (14)	8.1 (18)
	Secondary side (magnet)	288mm / piece: 0.6 (1.4)	288mm / piece: 1.1 (2.5)				288mm / piece: 3.2 (7.1)			
		384mm / piece: 0.8 (1.8)	384mm / piece: 1.4 (3.1)				384mm / piece: 4.3 (9.5)			
		480mm / piece: 1.0 (2.2)	480mm / piece: 1.8 (4.0)				480mm / piece: 5.3 (12)			
	768mm / piece: 1.6 (3.6)	768mm / piece: 2.9 (6.4)				768mm / piece: 8.5 (19)				
Secondary side model LM-H2	S10-□-4SS0	S20-□-1SS0				S30-□-1SS0				
Recommended load / motor mass ratio		Maximum of 30 times the mass of the linear servo motor's primary side								
Structure		Open (protection level: IP00)								
Environment	Ambient temperature	0 to 40°C (32 to 104°F) (non freezing), storage: -15 to 70°C (5 to 158°F) (non freezing)								
	Ambient humidity	80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)								
	Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Vibration	49m/s ² maximum								
	Elevation	1000m or less above sea level								

Notes: 1. The linear servo motor's maximum speed or linear encoder's rated speed, whichever is smaller, is the upper limit value of the linear servo motor's speed.

●LM-H2 series thrust characteristics



LINEAR SERVO LM series

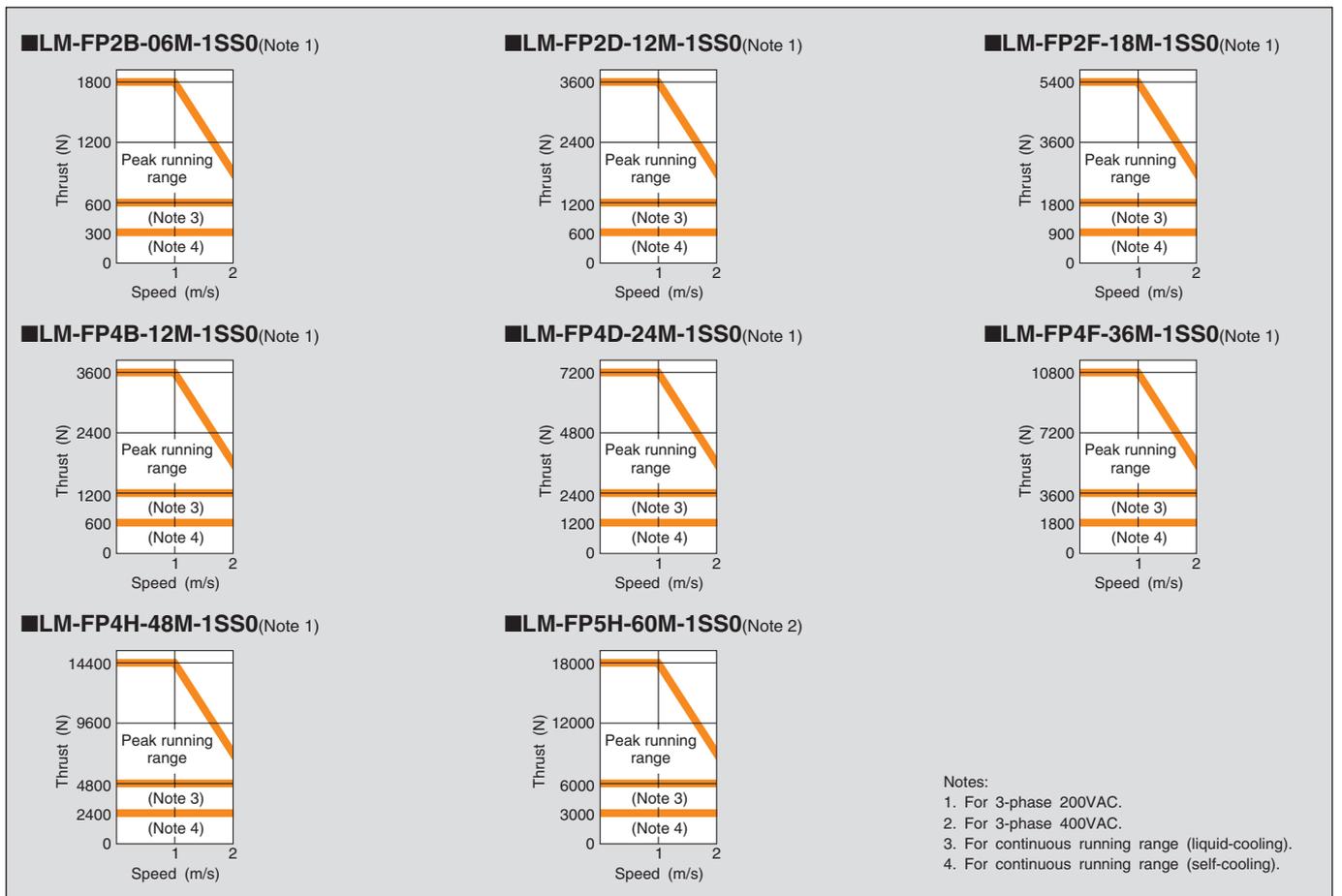
Linear servo motor specifications

●LM-F Series

Linear servo motor model		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 2)
Amplifier model MR-J3-	Self-cooling		200B-RJ004U518	500B-RJ004U520	700B-RJ004U522	500B-RJ004U524	700B-RJ004U526	11KB-RJ004U528	15KB-RJ004U530	22KB4-RJ004U532
	Liquid-cooling		200B-RJ004U519	500B-RJ004U521	700B-RJ004U523	500B-RJ004U525	700B-RJ004U527	11KB-RJ004U529	15KB-RJ004U531	22KB4-RJ004U533
Power facility capacity (kVA)			3.5	5.5	10	7.5	18	18	18	22
Cooling method			Self-cooling or liquid-cooling							
Thrust	Continuous (Self-cooling) (N)		300	600	900	600	1200	1800	2400	3000
	Continuous (Liquid-cooling) (N)		600	1200	1800	1200	2400	3600	4800	6000
	Maximum (N)		1800	3600	5400	3600	7200	10800	14400	18000
Maximum speed (m/s)(Note1)			2.0							
Magnetic attraction force (N)			4500	9000	13500	9000	18000	27000	36000	45000
Mass (kg [lb])	Primary side (coil)		9 (20)	18 (40)	27 (60)	14 (31)	28 (62)	42 (93)	56 (125)	67 (150)
	Secondary side (magnet)		480mm / piece: 7.1 (16) 576mm / piece: 9.0 (20)			480mm / piece: 13.5 (30) 576mm / piece: 16.0 (36)			480mm / piece: 20.0 (44) 576mm / piece: 26.0 (58)	
Secondary side model		LM-F	S20-□-1SS0			S40-□-1SS0			S50-□-1SS0	
Recommended load / motor mass ratio			Maximum of 15 times the mass of the linear servo motor's primary side							
Structure			Open (protection level: IP00)							
Environment	Ambient temperature		0 to 40°C (32 to 104°F) (non freezing), storage: -15 to 70°C (5 to 158°F) (non freezing)							
	Ambient humidity		80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)							
	Atmosphere		Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust							
	Vibration		49m/s ² maximum							
	Elevation		1000m or less above sea level							

Notes: 1. The linear servo motor's maximum speed or linear encoder's rated speed, whichever is smaller, is the upper limit value of the linear servo motor's speed.
2. Use 400VAC rated servo amplifier.

●LM-F series thrust characteristics

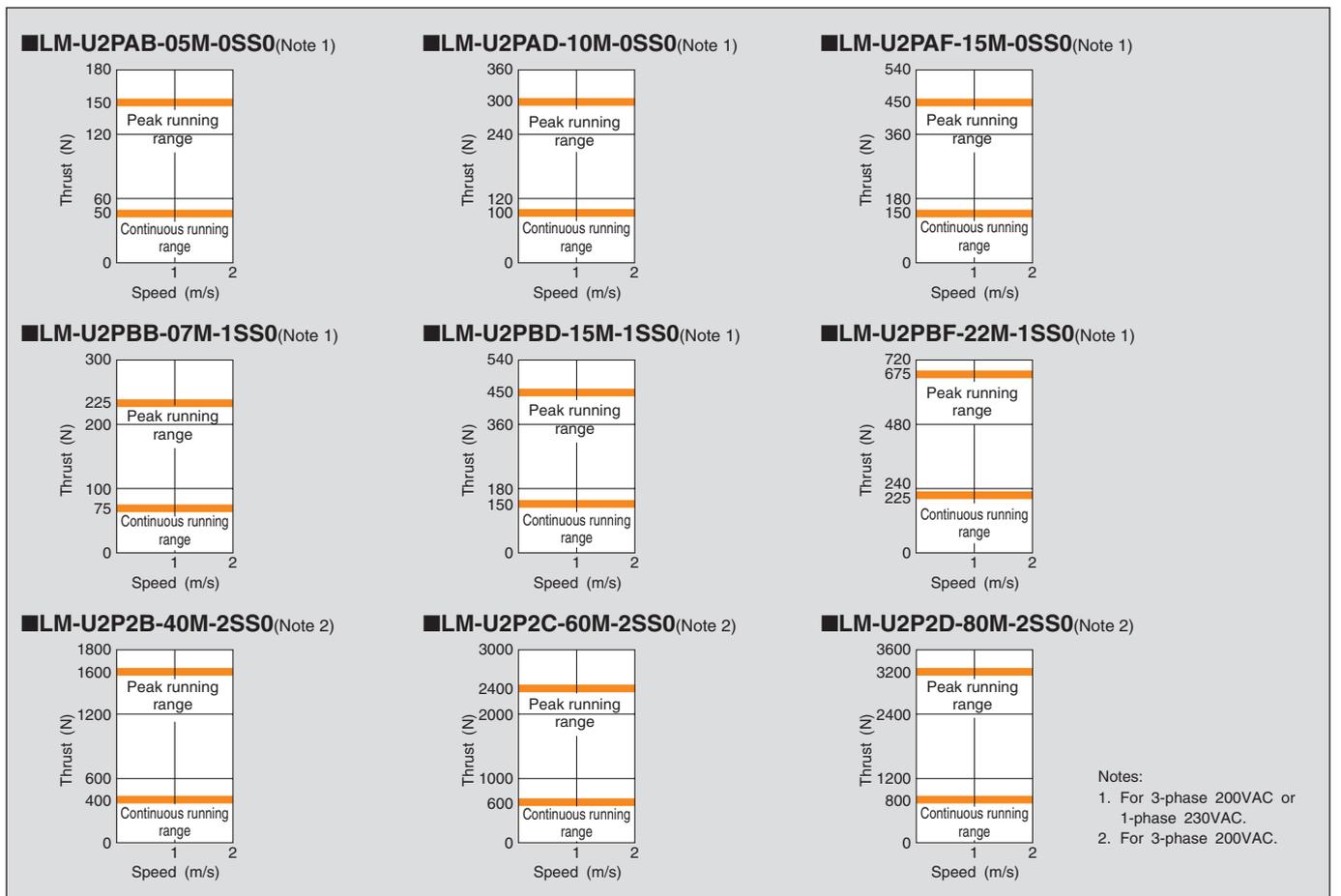


●LM-U2 Series

Linear servo motor model	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
Amplifier model	MR-J3-	20B-RJ004U512	40B-RJ004U513	40B-RJ004U514	20B-RJ004U515	60B-RJ004U516	70B-RJ004U517	200B-RJ004U509	350B-RJ004U510	500B-RJ004U511
Power facility capacity (kVA)		0.5	0.9	0.9	0.5	1.0	1.3	3.5	5.5	7.5
Cooling method		Self-cooling								
Thrust	Continuous (N)	50	100	150	75	150	225	400	600	800
	Maximum (N)	150	300	450	225	450	675	1600	2400	3200
Maximum speed (m/s)(Note 1)		2.0								
Magnetic attraction force (N)		0								
Mass (kg [lb])	Primary side (coil)	0.3 (0.67)	0.6 (1.4)	0.8 (1.8)	0.4 (0.89)	0.8 (1.8)	1.1 (2.5)	2.9 (6.4)	4.2 (9.3)	5.5 (13)
	Secondary side (magnet)	240mm / piece: 2.0 (4.4) 300mm / piece: 2.5 (5.6) 420mm / piece: 3.5 (7.8)			240mm / piece: 2.6 (5.8) 300mm / piece: 3.2 (7.1) 420mm / piece: 4.5 (10)			300mm / piece: 9.6 (22) 480mm / piece: 15.3 (34)		
		Secondary side model LM-U2	SA0-□-0SS0			SB0-□-1SS0			S20-□-2SS0	
Recommended load / motor mass ratio		Maximum of 30 times the mass of the linear servo motor's primary side								
Structure		Open (protection level: IP00)								
Environment	Ambient temperature	0 to 40°C (32 to 104°F) (non freezing), storage: -15 to 70°C (5 to 158°F) (non freezing)								
	Ambient humidity	80% RH maximum (non condensing), storage: 90% RH maximum (non condensing)								
	Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust								
	Vibration	49m/s ² maximum								
	Elevation	1000m or less above sea level								

Notes: 1. The linear servo motor's maximum speed or linear encoder's rated speed, whichever is smaller, is the upper limit value of the linear servo motor's speed.

●LM-U2 series thrust characteristics



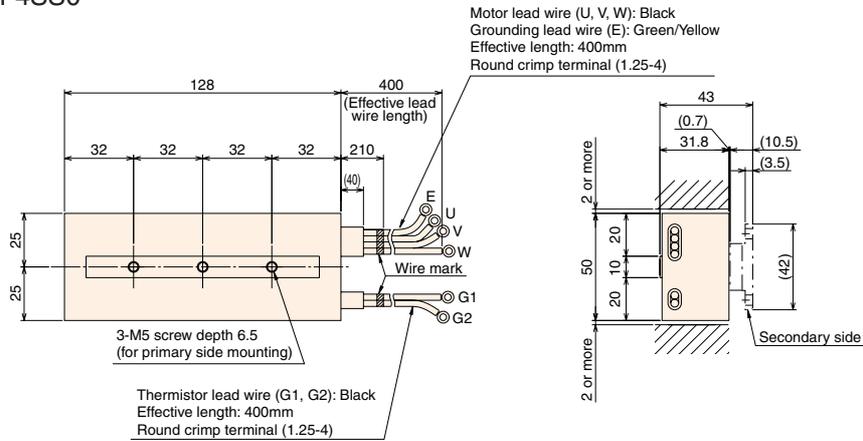
LINEAR SERVO LM series

Linear servo motor dimensions

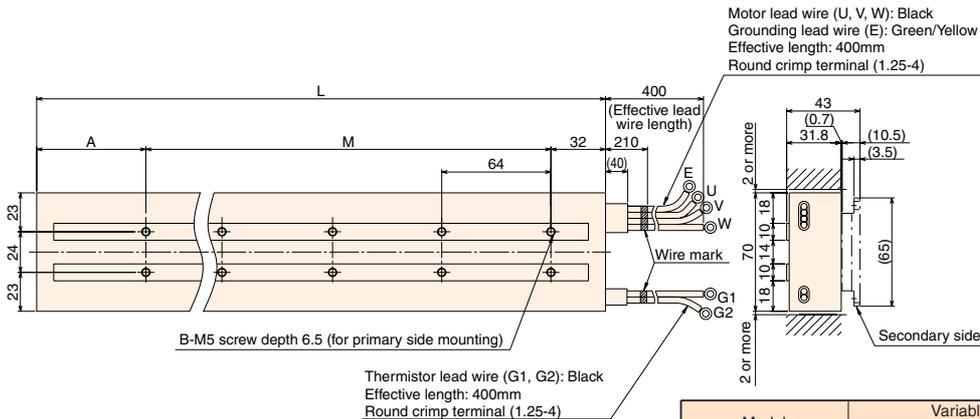
●LM-H2 series: Primary side (coil)

(Unit: mm)

●LM-H2P1A-06M-4SS0

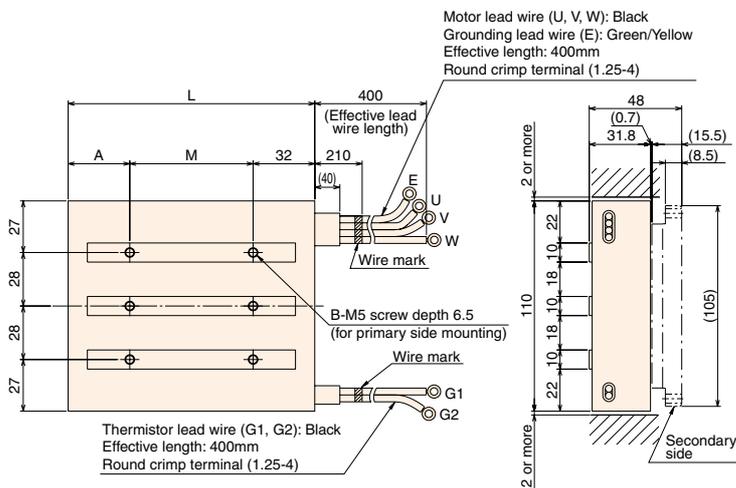


●LM-H2P2A-12M-1SS0 ●LM-H2P2B-24M-1SS0 ●LM-H2P2C-36M-1SS0 ●LM-H2P2D-48M-1SS0



Model	Variable dimensions			
	L	M	A	B
LM-H2P2A-12M-1SS0	128	64	(32)	2×2
LM-H2P2B-24M-1SS0	224	2×64 (=128)	(64)	3×2
LM-H2P2C-36M-1SS0	320	4×64 (=256)	(32)	5×2
LM-H2P2D-48M-1SS0	416	5×64 (=320)	(64)	6×2

●LM-H2P3A-24M-1SS0 ●LM-H2P3B-48M-1SS0 ●LM-H2P3C-72M-1SS0 ●LM-H2P3D-96M-1SS0

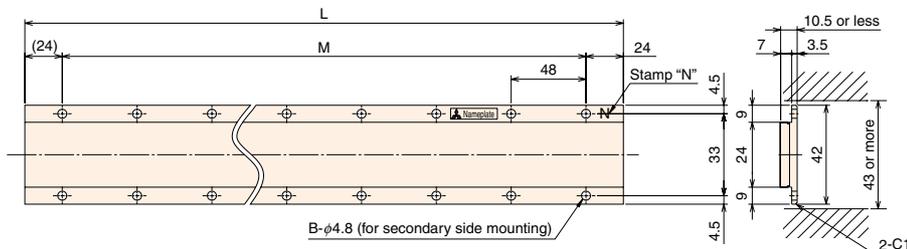


Model	Variable dimensions			
	L	M	A	B
LM-H2P3A-24M-1SS0	128	64	32	2×3
LM-H2P3B-48M-1SS0	224	2×64 (=128)	64	3×3
LM-H2P3C-72M-1SS0	320	4×64 (=256)	32	5×3
LM-H2P3D-96M-1SS0	416	5×64 (=320)	64	6×3

●LM-H2 series: Secondary side (magnet)

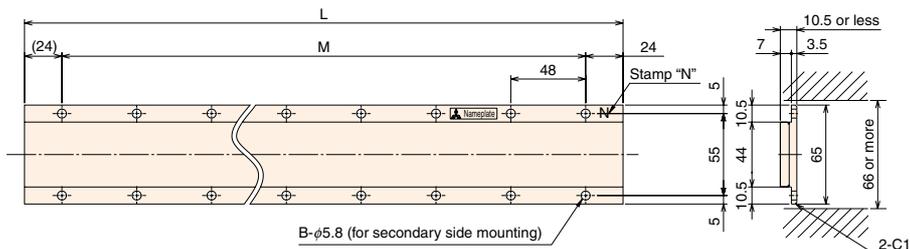
(Unit: mm)

- LM-H2S10-288-4SS0 ●LM-H2S10-384-4SS0 ●LM-H2S10-480-4SS0 ●LM-H2S10-768-4SS0



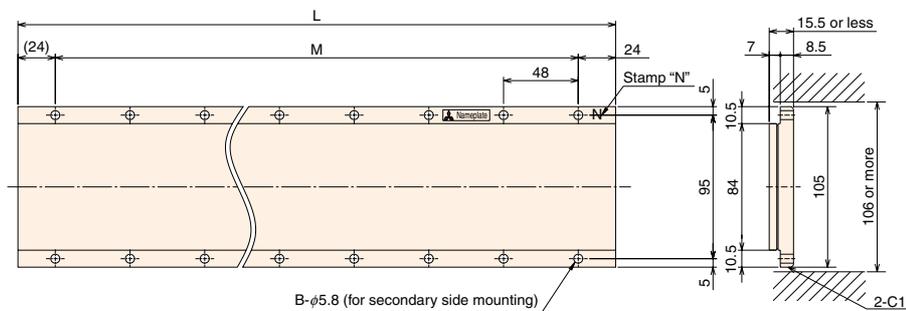
Model	Variable dimensions		
	L	M	B
LM-H2S10-288-4SS0	288	5×48 (=240)	6×2
LM-H2S10-384-4SS0	384	7×48 (=336)	8×2
LM-H2S10-480-4SS0	480	9×48 (=432)	10×2
LM-H2S10-768-4SS0	768	15×48 (=720)	16×2

- LM-H2S20-288-1SS0 ●LM-H2S20-384-1SS0 ●LM-H2S20-480-1SS0 ●LM-H2S20-768-1SS0



Model	Variable dimensions		
	L	M	B
LM-H2S20-288-1SS0	288	5×48 (=240)	6×2
LM-H2S20-384-1SS0	384	7×48 (=336)	8×2
LM-H2S20-480-1SS0	480	9×48 (=432)	10×2
LM-H2S20-768-1SS0	768	15×48 (=720)	16×2

- LM-H2S30-288-1SS0 ●LM-H2S30-384-1SS0 ●LM-H2S30-480-1SS0 ●LM-H2S30-768-1SS0



Model	Variable dimensions		
	L	M	B
LM-H2S30-288-1SS0	288	5×48 (=240)	6×2
LM-H2S30-384-1SS0	384	7×48 (=336)	8×2
LM-H2S30-480-1SS0	480	9×48 (=432)	10×2
LM-H2S30-768-1SS0	768	15×48 (=720)	16×2

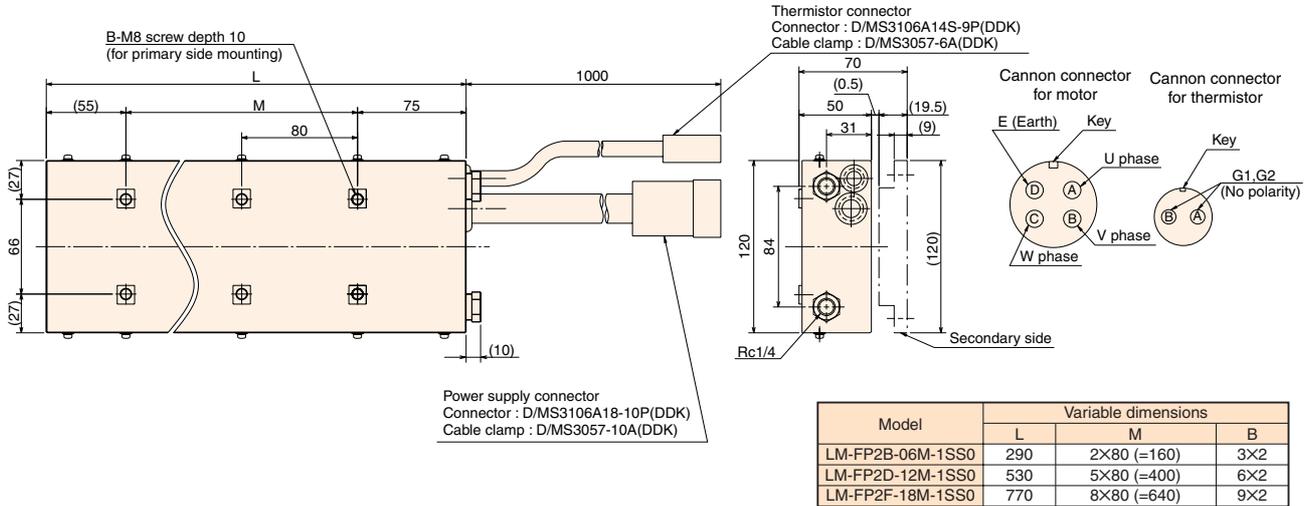
LINEAR SERVO LM series

Linear servo motor dimensions

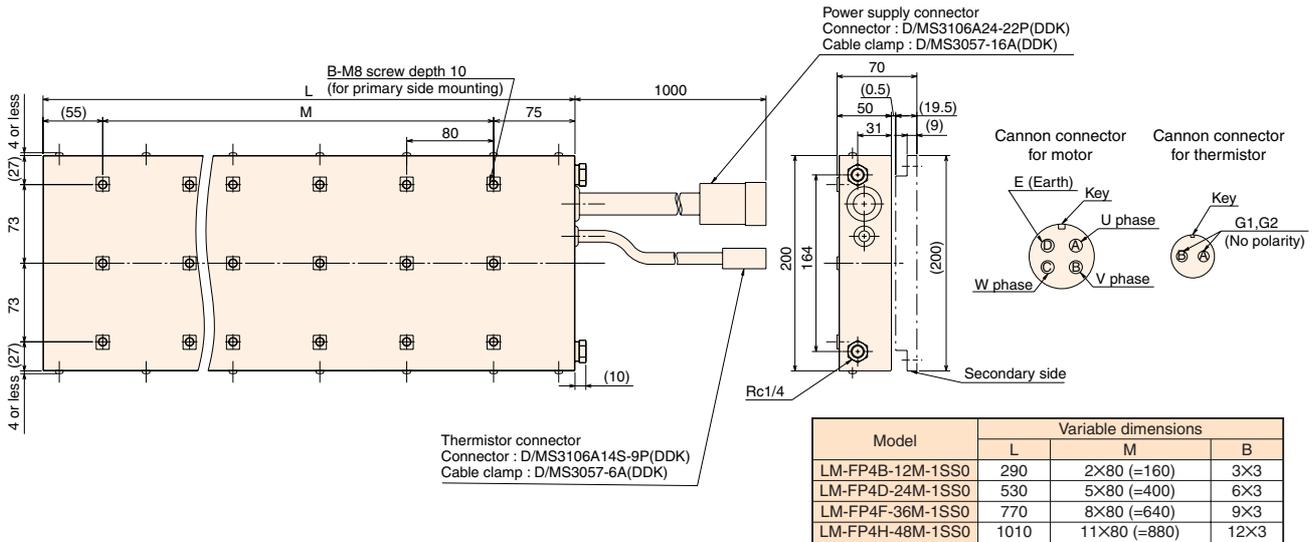
●LM-F series: Primary side (coil)

(Unit: mm)

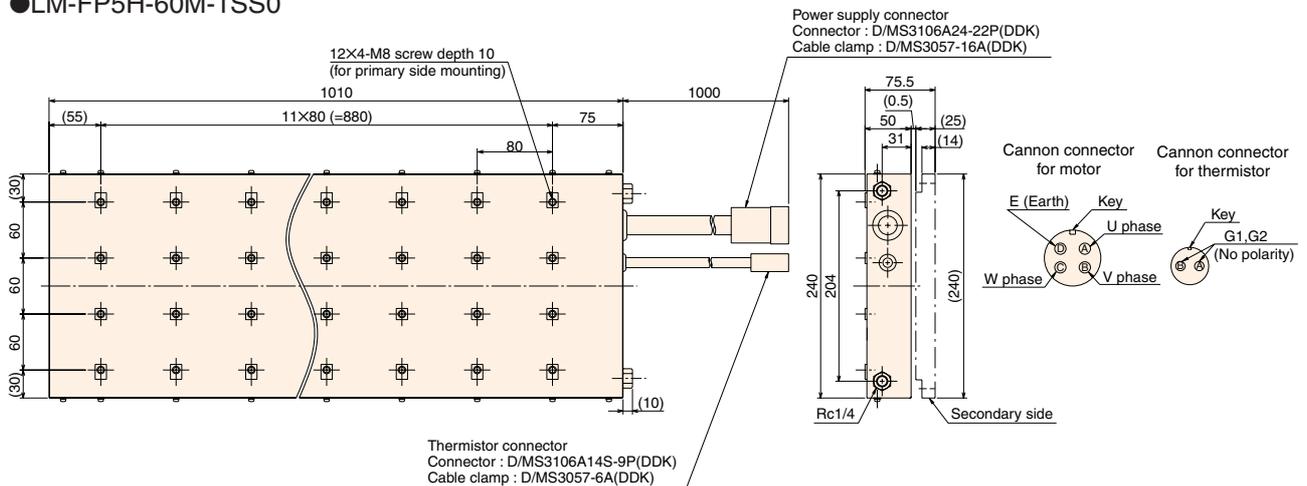
●LM-FP2B-06M-1SS0 ●LM-FP2D-12M-1SS0 ●LM-FP2F-18M-1SS0



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



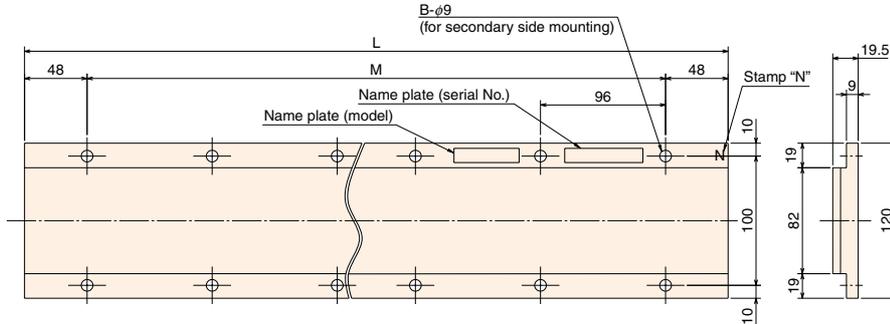
●LM-FP5H-60M-1SS0



●LM-F series: Secondary side (magnet)

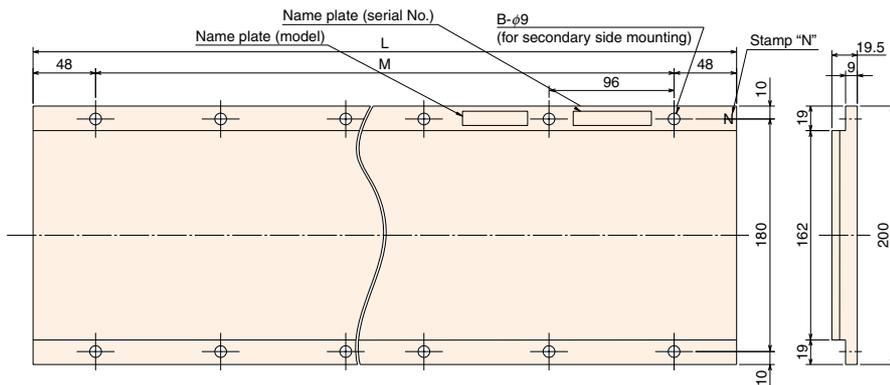
(Unit: mm)

- LM-FS20-480-1SS0 ●LM-FS20-576-1SS0



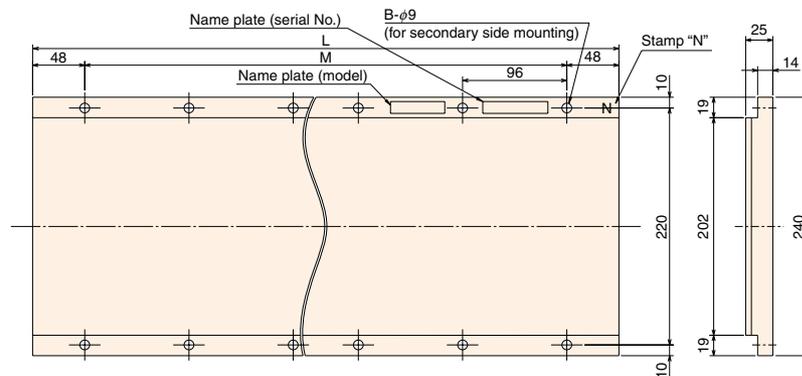
Model	Variable dimensions		
	L	M	B
LM-FS20-480-1SS0	480	4×96 (=384)	5×2
LM-FS20-576-1SS0	576	5×96 (=480)	6×2

- LM-FS40-480-1SS0 ●LM-FS40-576-1SS0



Model	Variable dimensions		
	L	M	B
LM-FS40-480-1SS0	480	4×96 (=384)	5×2
LM-FS40-576-1SS0	576	5×96 (=480)	6×2

- LM-FS50-480-1SS0 ●LM-FS50-576-1SS0



Model	Variable dimensions		
	L	M	B
LM-FS50-480-1SS0	480	4×96 (=384)	5×2
LM-FS50-576-1SS0	576	5×96 (=480)	6×2

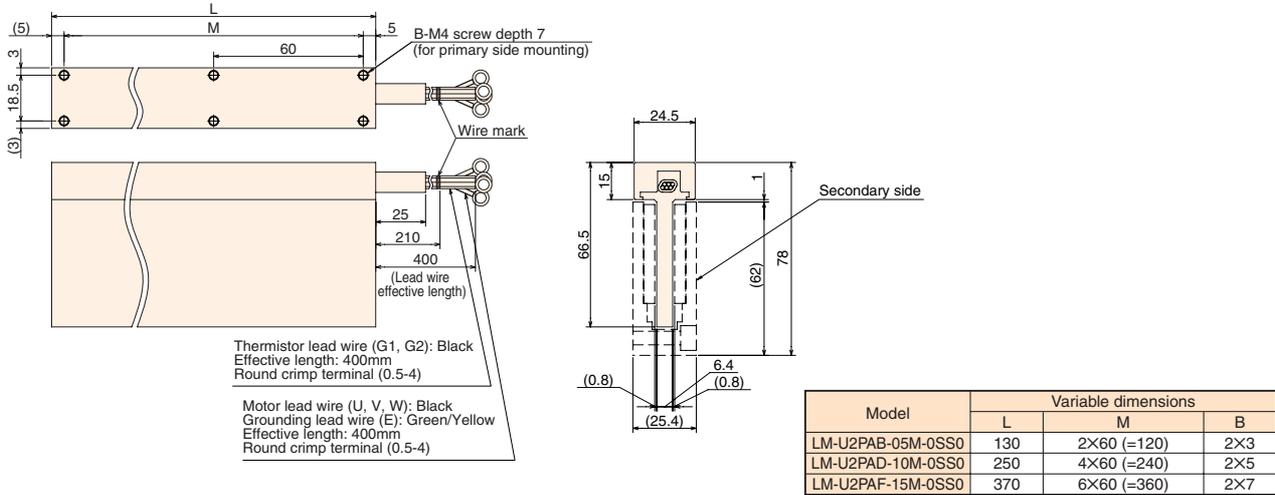
LINEAR SERVO LM series

Linear servo motor dimensions

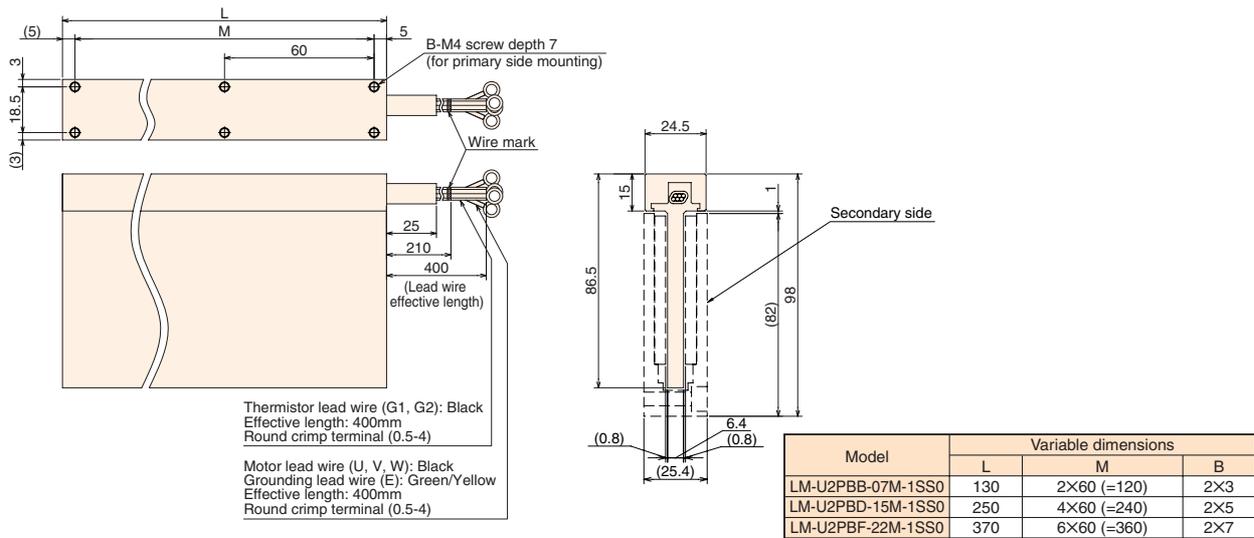
●LM-U2 series: Primary side (coil)

(Unit: mm)

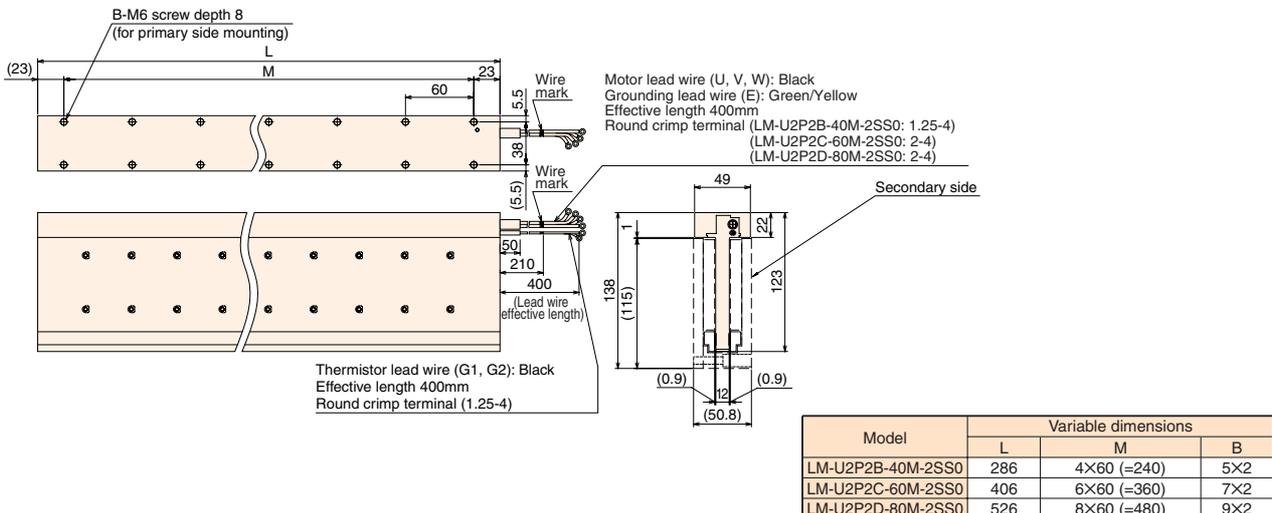
●LM-U2PAB-05M-0SS0 ●LM-U2PAD-10M-0SS0 ●LM-U2PAF-15M-0SS0



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



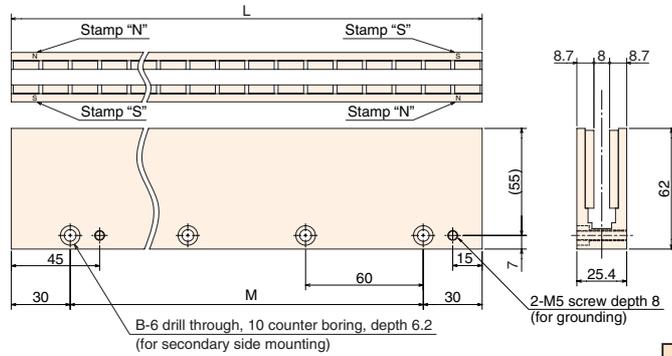
●LM-U2P2B-40M-2SS0 ●LM-U2P2C-60M-2SS0 ●LM-U2P2D-80M-2SS0



●LM-U2 series: Secondary side (magnet)

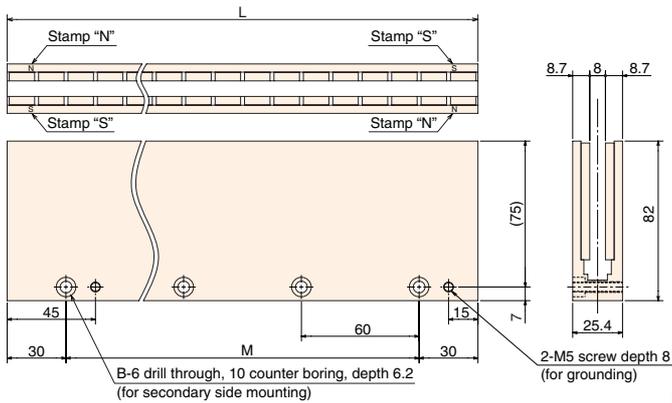
(Unit: mm)

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



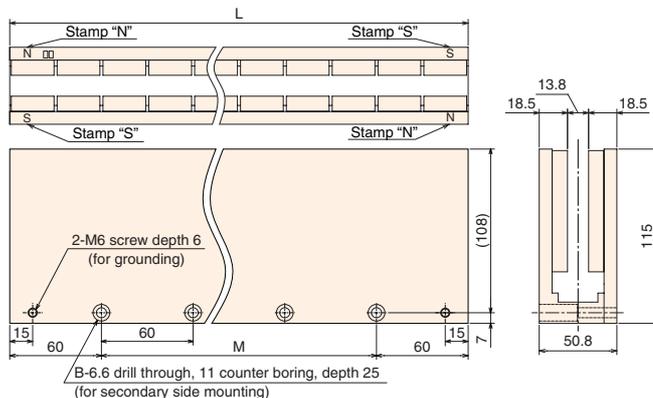
Model	Variable dimensions		
	L	M	B
LM-U2SA0-240-0SS0	240	3×60 (=180)	4
LM-U2SA0-300-0SS0	300	4×60 (=240)	5
LM-U2SA0-420-0SS0	420	6×60 (=360)	7

- LM-U2SB0-240-1SS0 ●LM-U2SB0-300-1SS0 ●LM-U2SB0-420-1SS0



Model	Variable dimensions		
	L	M	B
LM-U2SB0-240-1SS0	240	3×60 (=180)	4
LM-U2SB0-300-1SS0	300	4×60 (=240)	5
LM-U2SB0-420-1SS0	420	6×60 (=360)	7

- LM-U2S20-300-2SS0 ●LM-U2S20-480-2SS0



Model	Variable dimensions		
	L	M	B
LM-U2S20-300-2SS0	300	3×60 (=180)	4
LM-U2S20-480-2SS0	480	6×60 (=360)	7

Servo amplifier specifications

Servo amplifier model MR-J3-		20B-RJ004U	40B-RJ004U	60B-RJ004U	70B-RJ004U	200B-RJ004U	350B-RJ004U	500B-RJ004U	700B-RJ004U	11KB-RJ004U	15KB-RJ004U	22KB4-RJ004U
Main circuit power supply	Voltage/frequency (Note 1)	3-phase 200 to 230VAC 50/60Hz or 1-phase 200 to 230VAC 50/60Hz				3-phase 200 to 230VAC 50/60Hz						3-phase 380 to 480VAC 50/60Hz
	Permissible voltage fluctuation	For 3-phase 200 to 230VAC: 3-phase 170 to 253VAC For 1-phase 200 to 230VAC: 1-phase 170 to 253VAC				3-phase 170 to 253VAC						3-phase 323 to 528VAC
	Permissible frequency fluctuation	±5% maximum										
Control circuit power supply	Voltage/frequency	1-phase 200 to 230VAC 50/60Hz										1-phase 380 to 480VAC 50/60Hz
	Permissible voltage fluctuation	1-phase 170 to 253VAC										1-phase 323 to 528VAC
	Permissible frequency fluctuation	±5% maximum										
	Power consumption (W)	30						45				
Interface power supply		24VDC ±10% (required current capacity: 150mA (Note 3))										
Linear encoder interface	Serial interface		Mitsubishi high-speed serial communication									
	Pulse train input interface	Input signal	ABZ phase differential input signal									
		Minimum phase difference	200ns									
Regenerative resistor / tolerable regenerative power (W) (Note 4,5)	Built-in regenerative resistor	10	10	10	20	100	100	130	170	—	—	—
	External regenerative resistor (Note 6)	—	—	—	—	—	—	—	—	500 (800)	850 (1300)	850 (1300)
Control system		Sine-wave PWM control/current control system										
Dynamic brake		Built-in						External option				
Safety features		Overcurrent shutdown, regeneration overvoltage shutdown, overload shutdown (electronic thermal), servo motor overheat protection, encoder fault protection, regeneration fault protection, undervoltage/sudden power outage protection, overspeed protection, excess error protection										
Structure		Self-cooling open (IP00)					Fan cooling open (IP00)					
Environment	Ambient temperature (Note 2)	0 to 55°C (32 to 131°F) (non freezing), storage: -20 to 65°C (-4 to 149°F) (non freezing)										
	Ambient humidity	90% RH maximum (non condensing), storage: 90% RH maximum (non condensing)										
	Atmosphere	Indoors (no direct sunlight); no corrosive gas, inflammable gas, oil mist or dust										
	Elevation	1000m or less above sea level										
	Vibration	5.9m/s ² maximum										
Mass (kg [lb])	0.8 (1.8)	1.0 (2.2)	1.0 (2.2)	1.4 (3.1)	2.3 (5.1)	2.3 (5.1)	4.6 (10)	6.2 (14)	18 (40)	18 (40)	19 (42)	

- Notes: 1. Rated thrust and speed of a linear servo motor are applicable when the servo amplifier, combined with the linear servo motor, is operated within the specified power supply voltage and frequency. Thrust drops when the power supply voltage is below the specified value.
 2. The MR-J3-350B-RJ004U or smaller servo amplifier can be installed closely. In this case, keep the ambient temperature within 0 to 45°C (32 to 113°F), or use them with 75% or less of the effective load rate.
 3. 150mA is the value when all of the input/output points are used. The current capacity can be stepped down according to the number of input/output points in use.
 4. Optimal regenerative resistor varies for each system.
 5. Refer to the section "Selecting linear servo 3. Selecting optional regenerative unit" in this catalog for the tolerable regenerative power (W).
 6. The value applies when the external regenerative resistors, GRZG400-□Ω, (standard accessory) are used with cooling fans (2 units of 92x92mm, minimum air flow: 1.0m³/min). Note that change in the parameter No. PA02 is required.

Peripheral equipment

●Electrical wires, circuit breakers, magnetic contactors (example of selection)

The following are examples of wire sizes when 600V polyvinyl chloride insulated wires with a length of 30m are used.

Servo amplifier	Circuit breaker	Magnetic contactor	Electrical wire size (mm ²)					
			L1, L2, L3, ⊕	L11, L21	U, V, W, ⊕	P, C	THM1, THM2	
MR-J3-20B-RJ004U	30A frame 5A	S-N10	2 (AWG14)	1.25 (AWG16)	1.25 (AWG16)	2 (AWG14)	0.2 (AWG24)	
MR-J3-40B-RJ004U	30A frame 10A							
MR-J3-60B-RJ004U	30A frame 15A							
MR-J3-70B-RJ004U								
MR-J3-200B-RJ004U	30A frame 20A	S-N18	3.5 (AWG12)	1.25 (AWG16)	1.25 (AWG16)	2 (AWG14)	0.2 (AWG24)	
MR-J3-350B-RJ004U	30A frame 30A	S-N20						
MR-J3-500B-RJ004U (Note 1)	50A frame 50A	S-N35						5.5 (AWG10)
MR-J3-700B-RJ004U (Note 1)	100A frame 75A	S-N50						8 (AWG8)
MR-J3-11KB-RJ004U (Note 1)	100A frame 100A	S-N65	14 (AWG6)	1.25 (AWG16)	1.25 (AWG16)	22 (AWG4)	0.2 (AWG24)	
MR-J3-15KB-RJ004U (Note 1)	225A frame 125A	S-N95	22 (AWG4)					
MR-J3-22KB4-RJ004U (Note 1)	225A frame 125A	S-N65	14 (AWG6)					

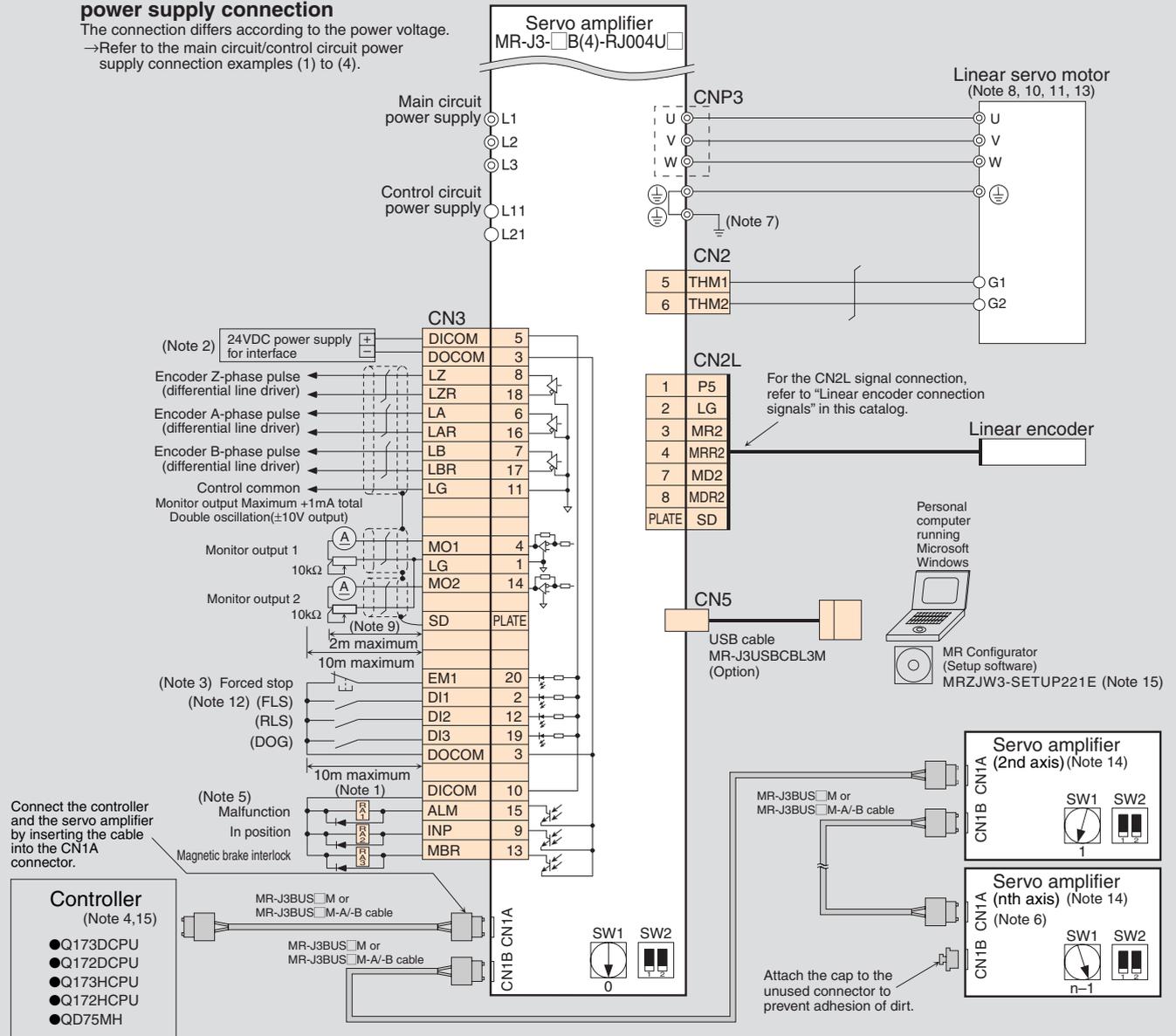
Notes: 1. When connecting the wires to the terminal screws, be sure to use the screws attached to the terminal blocks.

Standard wiring diagram

● Connection example

Main circuit/control circuit power supply connection

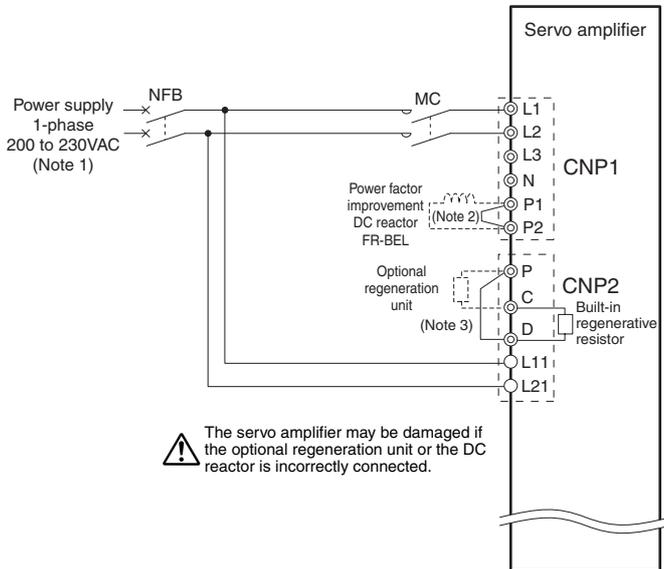
The connection differs according to the power voltage.
 →Refer to the main circuit/control circuit power supply connection examples (1) to (4).



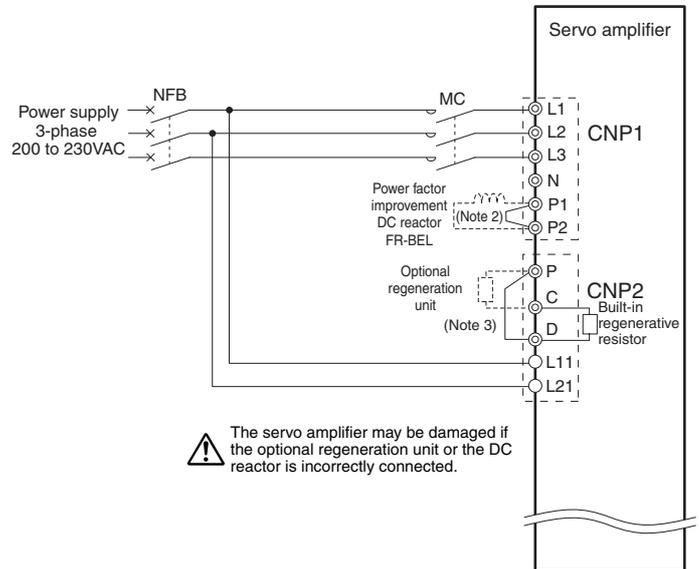
- Notes:
- Do not reverse the diode's direction. Connecting it backwards could cause the servo amplifier to malfunction such that the signals are not output, and the forced stop and other safety circuits are inoperable.
 - Use the power supply 24VDC±10% (required current capacity: 150mA). 150mA is the value when all of the input/output points are used. Note that the current capacity can be stepped down according to the number of input/output points in use. Refer to "MR-J3-□B SERVO AMPLIFIER INSTRUCTION MANUAL" for details.
 - The forced stop signal is issued for each axis' servo amplifier individually. Use this signal as necessary when Q173DCPU, Q172DCPU, Q173HCPU, Q172HCPU or QD75MH is connected. When not using, invalidate the forced stop input with the parameter No. PA04, or short-circuit EM1 and DOCOM in the connector. For overall system, apply the emergency stop on the controller side.
 - For details on the controllers, refer to relevant programming manual or user's manual.
 - The malfunction (ALM) signal is conducted to DOCOM in normal alarm-free condition.
 - Up to 16 axes (n = 1 to 16) can be connected using the axis selection rotary switch (SW1).
 - For grounding, connect the ground wire to the control box's protection ground terminal via the servo amplifier's protection ground terminal.
 - Do not connect a linear servo motor or a linear encoder which is not listed in this catalog. The linear servo motor may malfunction.
 - Connect the shield wire securely to the plate inside the connector (ground plate).
 - Linear servo motor with an electromagnetic brake is not available. Do not use the linear servo motor for vertical axis applications.
 - If the magnetic pole is detected while an external force is applied, the magnetic pole detection will not be accurate, and the linear servo motor may not operate. If there is no friction, change the magnetic pole detection parameters. Make sure that the linear servo motor does not operate with an external force while servo is OFF.
 - Signals in () can be assigned with the settings of the controller (Q173DCPU, Q172DCPU, Q173HCPU, Q172HCPU or QD75MH). Refer to the instruction manuals for each controller for details on the setting method.
 - The linear servo motor can reach high speeds, so a mechanical stopper must be installed at the end of the travel path to avoid hazards.
 - The motor-side connections for the second and following axes are omitted from the above diagram.
 - Refer to "List of compatible software versions" on p.26 in this catalog for the compatible software versions.

Main circuit/control circuit power supply connection examples

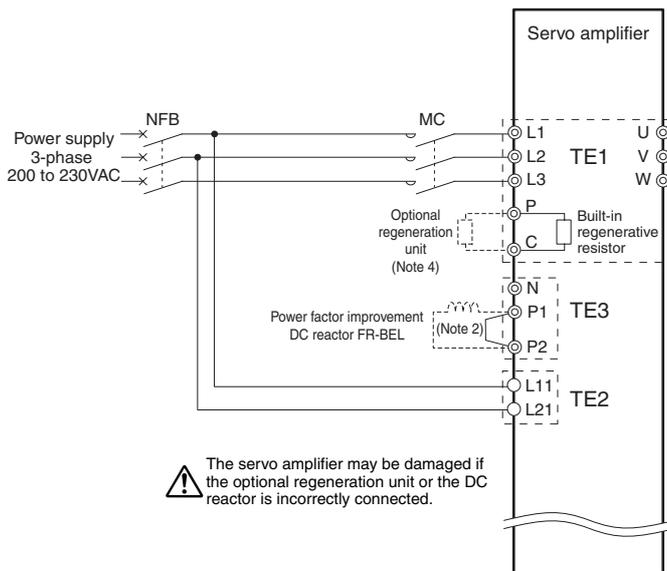
(1) 1-phase 200V



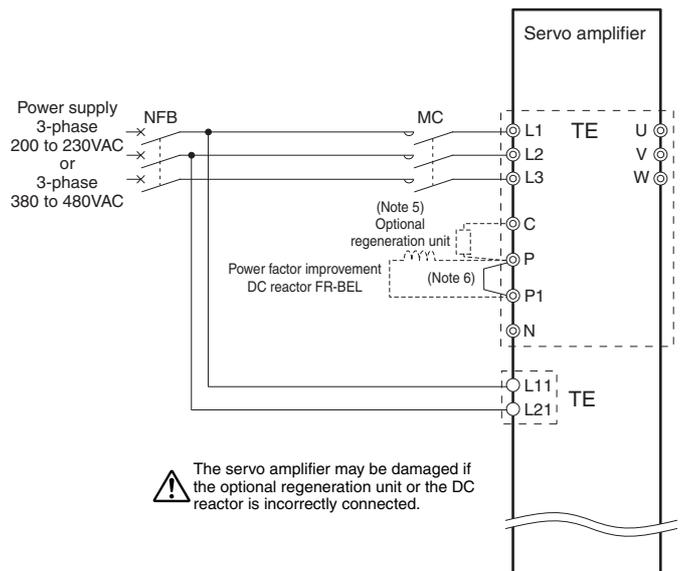
(2) 3-phase 200V 3.5kW or smaller



(3) 3-phase 200V 5kW or 7kW



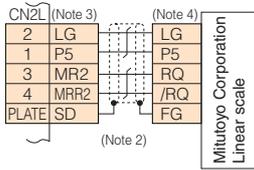
(4) 3-phase 200V 11kW or 15kW, or 3-phase 400V, 22kW



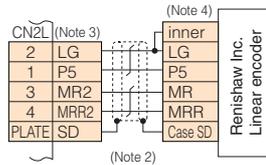
- Notes:
1. When using a 1-phase 200 to 230VAC (MR-J3-70B-RJ004□ or smaller), connect the power supply to the L1 and L2 terminals. Do not connect anything to L3.
 2. Disconnect P1 and P2 when using the DC reactor.
 3. Disconnect P and D when connecting the optional regeneration unit externally.
 4. Disconnect the wires for the built-in regenerative resistor (P and C) when connecting the optional regeneration unit externally.
 5. Servo amplifiers, 11kW or larger, do not have a built-in regenerative resistor.
 6. Remove the short bar between P and P1 when using the DC reactor.

Linear encoder connection signals (Note 1)

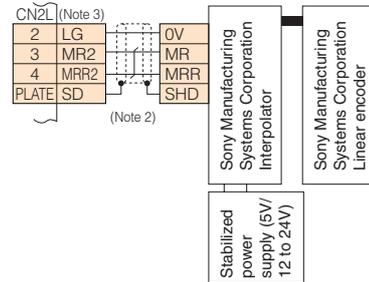
Mitutoyo Corporation Linear scale



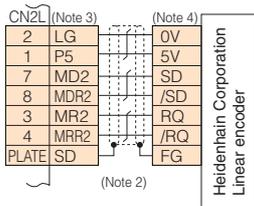
Renishaw Inc. Linear encoder



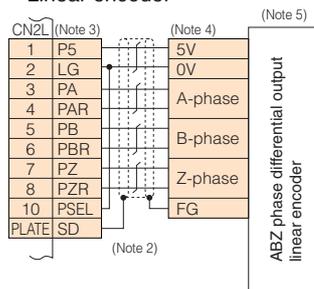
Sony Manufacturing Systems Corporation Linear encoder



Heidenhain Corporation Linear encoder



ABZ phase differential output Linear encoder



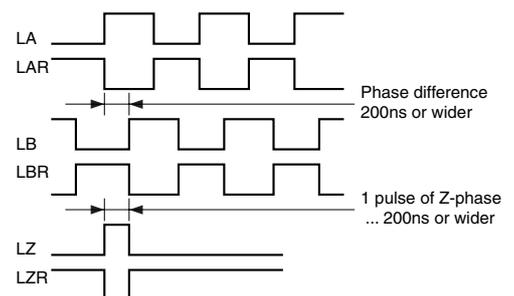
- Notes: 1. Do not connect a linear servo motor or a linear encoder which is not listed in this catalog. The linear servo motor may malfunction.
 2. Connect the shield wire securely to the plate inside the connector (ground plate).
 3. When manufacturing the linear encoder connection cable, use the optional CN2L connector (MR-J3CN2).
 4. Contact the relevant manufacturers for details on the pin numbers of the encoder or the interpolator.
 5. If the encoder's current consumption exceeds 350mA, supply power from an external source.

Compatible linear encoders

●List of compatible linear encoders (Note 1, 2)

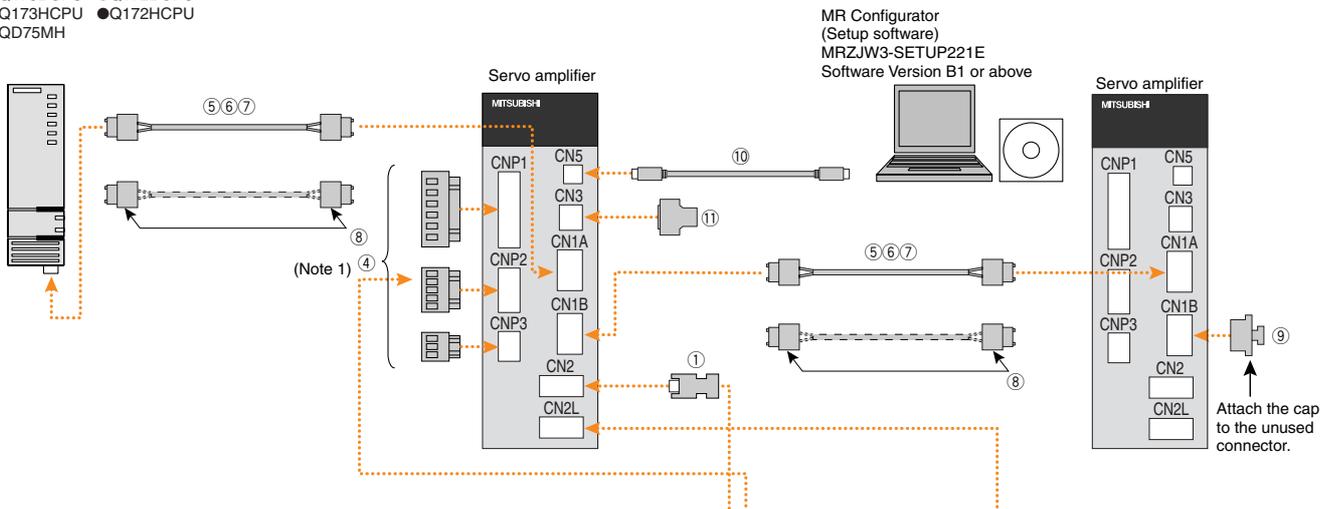
Linear encoder type	Manufacturer	Model	Resolution	Rated speed (Note 3)	Effective measurement length (maximum)	Communication method	Position system
Mitsubishi serial interface compatible	Mitutoyo Corporation	AT343A	0.05μm	2.0m/s	3000mm	2-wire type	Absolute
		AT543A-SC		2.5m/s	2200mm		
		ST741A	0.5μm	4.0m/s	6000mm		
		ST743A (Note 7)	0.1μm				
	Heidenhain Corporation	LC491M	0.05μm/0.01μm	2.0m/s	2040mm	4-wire type	
		LC192M		3.0m/s	4240mm		
Mitsubishi serial interface compatible	Sony Manufacturing Systems Corporation	SL710+PL101-R/RH+MJ830 or MJ831	0.2μm (Note 4)	6.4m/s	3000mm	2-wire type	Incremental
		SH13+MJ830 or MJ831	0.005μm (Note 4)	1.4m/s	1240mm		
	Renishaw Inc.	RGH26P	5μm	4.0m/s	70000mm		
		RGH26Q	1μm	3.2m/s			
		RGH26R	0.5μm	1.6m/s			
	Heidenhain Corporation	LIDA485+APE391M	0.005μm (20/4096μm)	4.0m/s	30040mm		
LIDA487+APE391M		6040mm					
ABZ phase differential output type (Note 5)	Incremental type	Not designated	-	Within tolerable resolution range (Note 6)	Depends on linear encoder	Depends on linear encoder	Differential 3-pair type

- Notes: 1. Consult with the relevant linear encoder manufacturer for details on the linear encoder's working environment and specifications.
 2. The linear servo motor generates heat. Take the linear encoder's working environment temperature into consideration when configuring the system.
 3. The indicated values are the linear encoder's rated speed when used in combination with the Mitsubishi linear compatible servo amplifier. The values may differ from each manufacturer's specifications. The linear servo motor's maximum speed or linear encoder's rated speed, whichever is smaller, is the upper limit value of the linear servo motor's speed.
 4. The resolution varies according to the setting value of the interpolator, MJ830/MJ831 manufactured by Sony Manufacturing Systems Corporation. Set the resolution between the minimum resolution and 5μm.
 5. Output the A-phase, B-phase and Z-phase signals in the differential line driver. The phase difference of A-phase pulse and B-phase pulse, and the width of Z-phase pulse must be 200ns or wider. Home position return is not possible with a linear encoder which is not equipped with a Z-phase.
 6. The tolerable resolution range is 0.005 to 5μm. Select the linear encoder within this range.
 7. Servo amplifier with software version A1 or above is compatible with this linear scale.

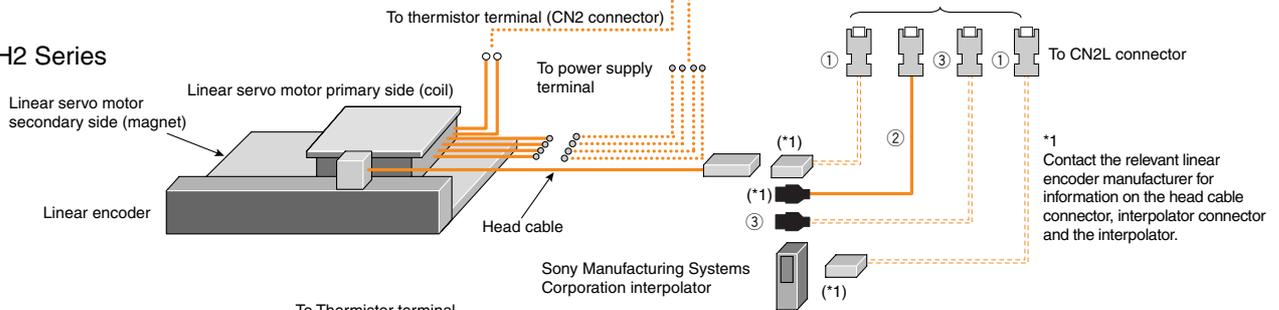


Options

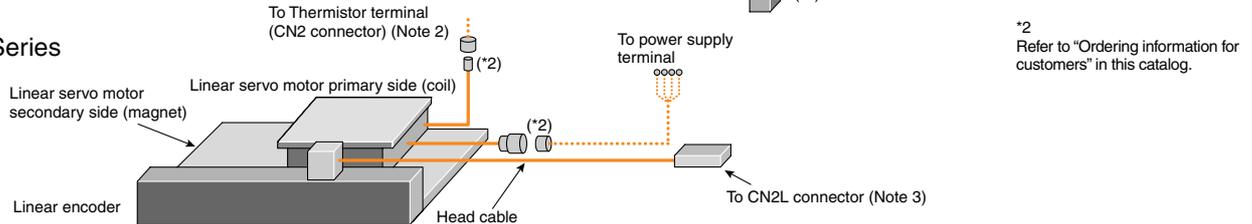
Servo system controller
 ●Q173DCPU ●Q172DCPU
 ●Q173HCPU ●Q172HCPU
 ●QD75MH



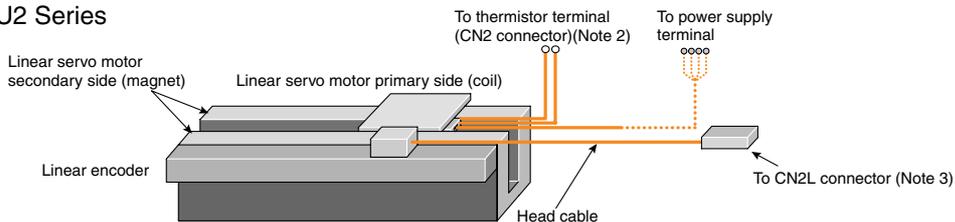
●LM-H2 Series



●LM-F Series



●LM-U2 Series



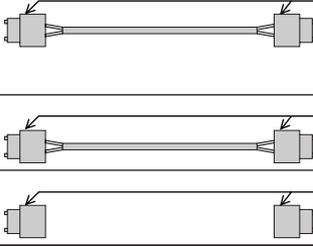
Notes: 1. The connector type is available for 3.5kW or smaller servo amplifiers. For 5kW or larger, connector blocks are mounted.
 2. The connection to the CN2 connector is the same as for the LM-H2 series.
 3. The connection to the CN2L connector is the same as for the LM-H2 series.

*Cautions regarding the linear encoders

- Linear encoder, head cable and encoder cable are not supplied with the linear servo motor. They must be prepared by user.
- Linear encoder and head cable, which are manufactured by the recommended manufacturers, must be used.
- Consult with the relevant manufacturers for details on the linear encoder's working environment and specifications.

Options

●Cables and connectors

Item		Model	Protection level	Description				
For CN2, CN2L	①	CN2 connector CN2L connector	MR-J3CN2	IP20	 Amplifier-side connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex)			
	②	Encoder cable Connectable to output cable for Mitutoyo Corporation's scale AT343A or AT543A-SC (long bending life cable)	MR-EKCB□M-H □=cable length 2, 5, 10m	IP20	Amplifier-side connector 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M), or 54599-1019 (connector set, Molex)  Junction connector (Tyco Electronics AMP) 1-172161-9 (housing) 170359-1 (connector pin) MTI-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL)			
	③	Encoder connector set Connectable to output cable for Mitutoyo Corporation's scale AT343A or AT543A-SC	MR-ECNM	IP20	 Amplifier-side connector 54599-1019 (connector set, Molex), or 36210-0100PL (receptacle, 3M) 36310-3200-008 (shell kit, 3M)  Junction connector (Tyco Electronics AMP) 1-172161-9 (housing) 170359-1 (connector pin) MTI-0002 (cable clamp, TOA ELECTRIC INDUSTRIAL) <Applicable cable example> Wire size: 0.3mm ² (AWG22) Completed cable outer diameter: φ8.2mm Crimping tool (91529-1) is required.			
For CNP1, CNP2, CNP3	④	Amplifier power supply connector set (Note 1)	(Standard accessory: Insertion type)	—	CNP1 connector  54928-0670 (connector) (Molex or an equivalent product)	CNP2 connector  54928-0520 (connector) (Molex or an equivalent product)	CNP3 connector  54928-0370 (connector) (Molex or an equivalent product)	Insertion tool  54932-0000 (Molex or an equivalent product)
		For 1kW or smaller			For 2kW or 3.5kW	CNP1 connector  PC4/6-STF-7.62-CRW (connector) (PHOENIX or an equivalent product)	CNP2 connector  54928-0520 (connector) (Molex or an equivalent product)	CNP3 connector  PC4/3-STF-7.62-CRW (connector) (PHOENIX or an equivalent product)
For controller, CN1A, CN1B	⑤	SSCNET III cable (Note 6) (Standard cord for inside panel)	MR-J3BUS□M □=cable length 0.15, 0.3, 0.5, 1, 3m	—	 Connector (Japan Aviation Electronics Industry) PF-2D103 (connector)			
	⑥	SSCNET III cable (Note 6) (Standard cable for outside panel)	MR-J3BUS□M-A □=cable length 5, 10, 20m	—				
	⑦	SSCNET III cable (Note 6) (Long distance cable, long bending life)	MR-J3BUS□M-B □=cable length 30, 40, 50m (Note 3)	—		Connector (Japan Aviation Electronics Industry) CF-2D103-S (connector)		
	⑧	Connector set for SSCNET III (Note 6)	MR-J3BCN1 (Note 5)	—		Connector (Japan Aviation Electronics Industry) PF-2D103 (connector)		
For CN1B	⑨	Connector cap for SSCNET III	(Standard accessory)	—				
For CN5	⑩	Personal computer communication cable USB cable	MR-J3USBCBL3M Cable length 3m	—	Amplifier-side connector mini-B connector (5 pins)  Personal computer-side connector A connector Note: This cable cannot be used with the SSCNET III compatible controller.			
For CN3	⑪	Input/output signal connector	MR-CCN1	—	 Amplifier-side connector (3M or an equivalent product) 10120-3000PE (connector) 10320-52F0-008 (shell kit) (Note 4)			

- Notes: 1. The connector type is available for 3.5kW or smaller servo amplifiers. For 5kW or larger, connector blocks are available.
 2. Refer to "MR-J3-□B SERVO AMPLIFIER INSTRUCTION MANUAL" for details on the electrical wire size recommended.
 3. Contact Mitsubishi for details on the long bending life cables shorter than 30m.
 4. The connector and the shell kit are soldered type. Models for press bonding type are 10120-6000EL (connector) and 10320-3210-000 (shell kit).
 5. Special tools are required. Contact Mitsubishi for details.
 6. Look carefully through the precautions enclosed with the options before use.

Ordering information for customers

To order the following products, contact the manufacturer directly.

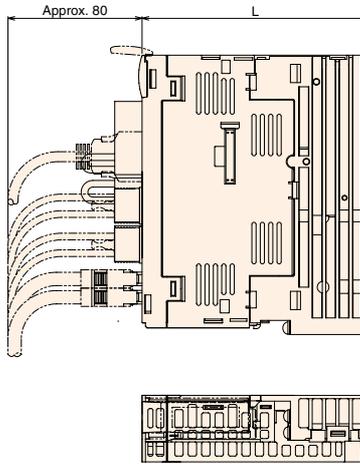
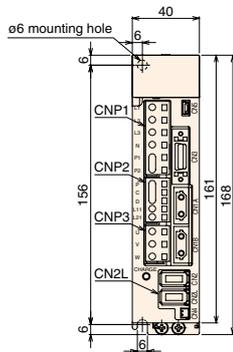
Item	Description
Power supply connector	For LM-FP2B, 2D and 2F  D/MS3101A18-10S (cable receptacle, DDK)  D/MS3057A-10A (cable clamp, DDK)
	For LM-FP4B, 4D, 4F, 4H and 5H  D/MS3101A24-22S (cable receptacle, DDK)  D/MS3057A-16A (cable clamp, DDK)
Thermistor connector	For LM-F series  D/MS3101A14S-9S (cable receptacle, DDK)  D/MS3057A-6A (cable clamp, DDK)

LINEAR SERVO LM series

Servo amplifier dimensions

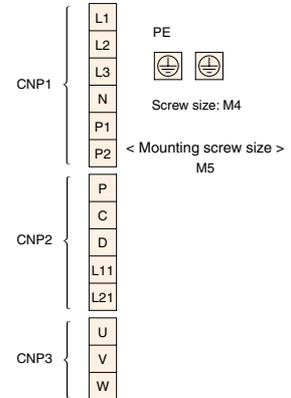
●MR-J3-20B-RJ004U□, 40B-RJ004U□, 60B-RJ004U□ (Note 1)

(Unit: mm)

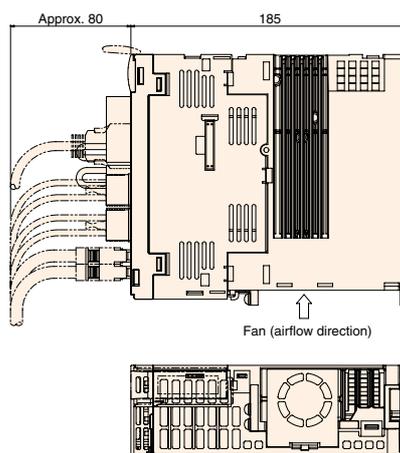
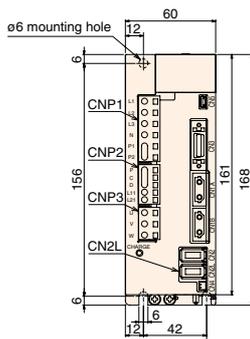


Model	Variable dimension L
MR-J3-20B-RJ004U□	135
MR-J3-40B-RJ004U□	170
MR-J3-60B-RJ004U□	170

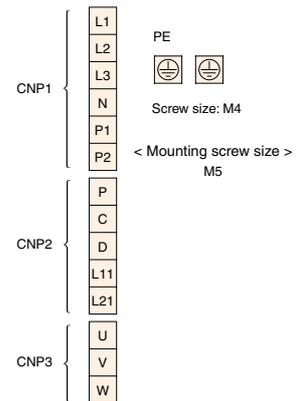
< Terminal arrangement >



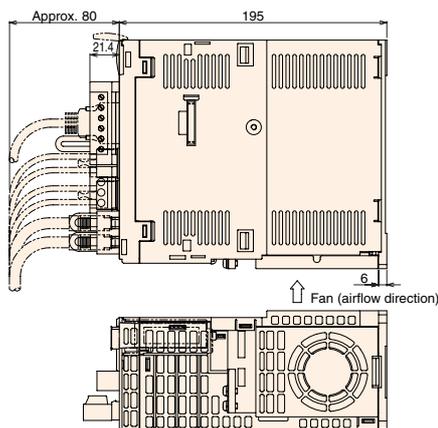
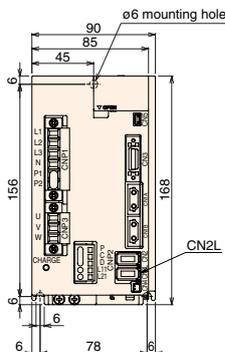
●MR-J3-70B-RJ004U□ (Note 1)



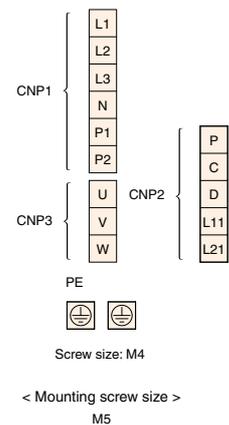
< Terminal arrangement >



●MR-J3-200B-RJ004U□, 350B-RJ004U□ (Note 1)



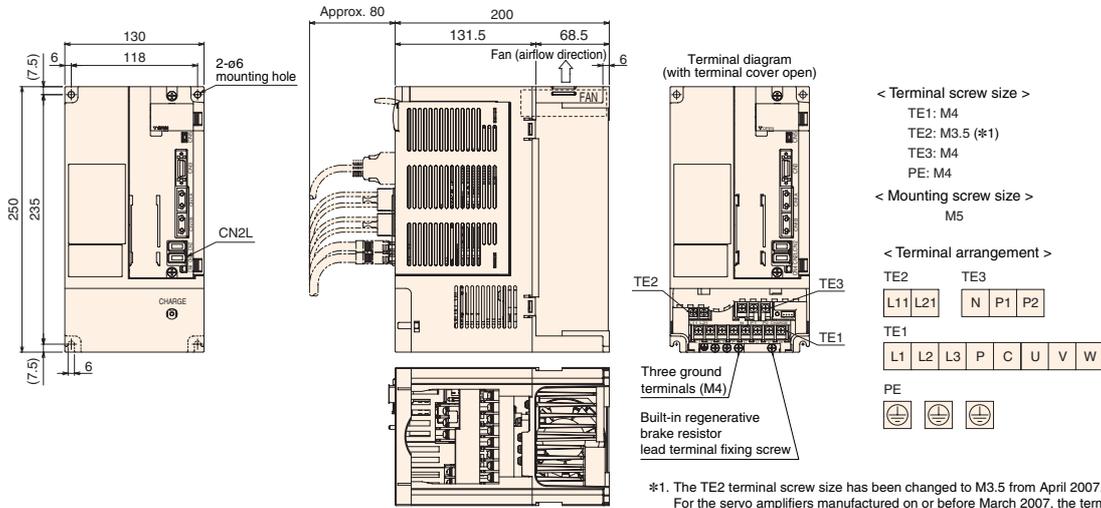
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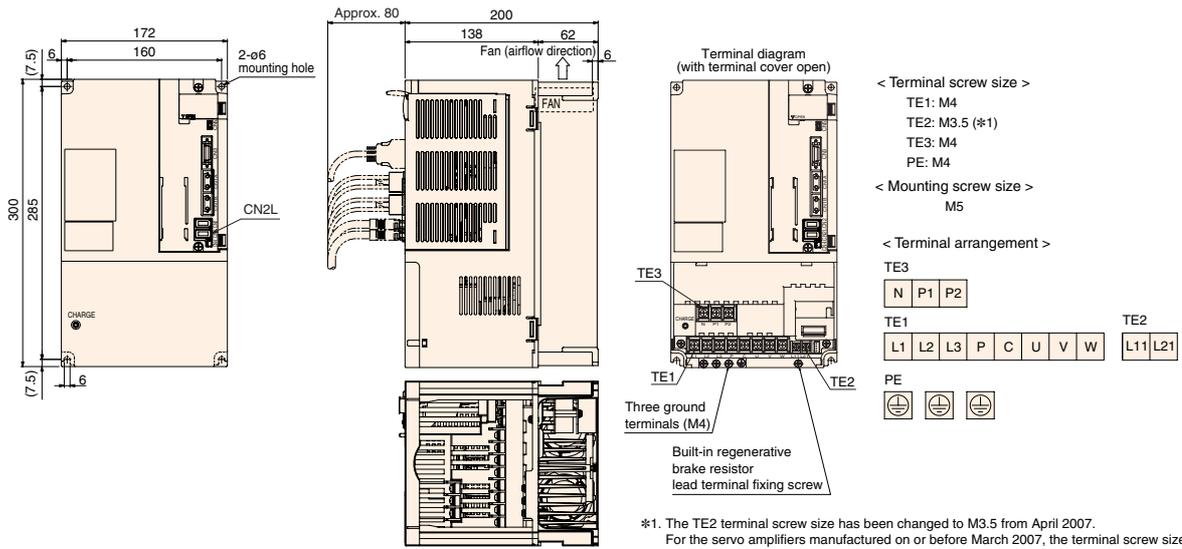
Notes: 1. The connectors CNP1, CNP2 and CNP3 (insertion type) are supplied with the servo amplifier.

●MR-J3-500B-RJ004U□

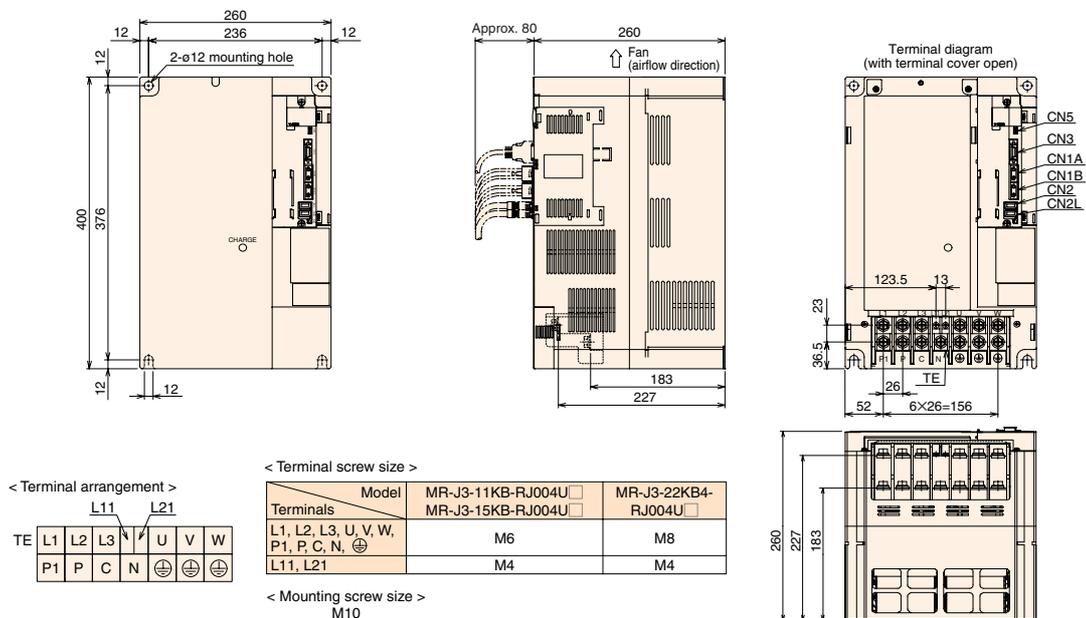
(Unit: mm)



●MR-J3-700B-RJ004U□



●MR-J3-11KB-RJ004U□, 15KB-RJ004U□, 22KB4-RJ004U□



Equipment configurations

Item	Model	Description		
Servo amplifier MR-J3-B-RJ004	MR-J3-20B-RJ004U□	For 200W	3-phase 200VAC to 230VAC or 1-phase 200VAC to 230VAC	
	MR-J3-40B-RJ004U□	For 400W		
	MR-J3-60B-RJ004U□	For 600W		
	MR-J3-70B-RJ004U□	For 750W		
	MR-J3-200B-RJ004U□	For 2kW	3-phase 200VAC to 230VAC	
	MR-J3-350B-RJ004U□	For 3.5kW		
	MR-J3-500B-RJ004U□	For 5kW		
	MR-J3-700B-RJ004U□	For 7kW		
	MR-J3-11KB-RJ004U□	For 11kW		
	MR-J3-15KB-RJ004U□	For 15kW		
MR-J3-22KB4-RJ004U□	For 22kW	3-phase 380VAC to 480VAC		
CN2, CN2L connector	MR-J3CN2	Amplifier-side connector		
Encoder cable	MR-EKCBL2M-H	2m	Long bending life	
	MR-EKCBL5M-H	5m		
	MR-EKCBL10M-H	10m		
Encoder connector set	MR-ECNM	Amplifier-side connector (CN2L)×1 and junction connector×1		
SSCNET III cable (Standard cord for inside panel)	MR-J3BUS015M	0.15m	Standard fiber-optic cable for MR-J3-B, Q173DCPU, Q172DCPU, 173HCPU and Q172HCPU	
	MR-J3BUS03M	0.3m		
	MR-J3BUS05M	0.5m		
	MR-J3BUS1M	1m		
	MR-J3BUS3M	3m		
SSCNET III cable (Standard cable for outside panel)	MR-J3BUS5M-A	5m		
	MR-J3BUS10M-A	10m		
	MR-J3BUS20M-A	20m		
SSCNET III cable (Long distance cable)	MR-J3BUS30M-B	30m		Long bending life fiber-optic cable for MR-J3-B, Q173DCPU, Q172DCPU, Q173HCPU and Q172HCPU
	MR-J3BUS40M-B	40m		
	MR-J3BUS50M-B	50m		
Connector set for SSCNET III	MR-J3BCN1	—		
Input/output signal connector	MR-CCN1	Amplifier-side connector (CN3)		
Personal computer communication cable	MR-J3USBCBL3M	3m	USB cable, for amplifier (CN5)	
LM-H2 series linear servo motor Primary side (coil)	LM-H2P1A-06M-4SS0	Continuous thrust: 60N. Maximum thrust: 150N		
	LM-H2P2A-12M-1SS0	Continuous thrust: 120N. Maximum thrust: 300N		
	LM-H2P2B-24M-1SS0	Continuous thrust: 240N. Maximum thrust: 600N		
	LM-H2P2C-36M-1SS0	Continuous thrust: 360N. Maximum thrust: 900N		
	LM-H2P2D-48M-1SS0	Continuous thrust: 480N. Maximum thrust: 1200N		
	LM-H2P3A-24M-1SS0	Continuous thrust: 240N. Maximum thrust: 600N		
	LM-H2P3B-48M-1SS0	Continuous thrust: 480N. Maximum thrust: 1200N		
	LM-H2P3C-72M-1SS0	Continuous thrust: 720N. Maximum thrust: 1800N		
	LM-H2P3D-96M-1SS0	Continuous thrust: 960N. Maximum thrust: 2400N		
LM-H2 series linear servo motor Secondary side (magnet)	LM-H2S10-288-4SS0	Length: 288mm		
	LM-H2S10-384-4SS0	Length: 384mm		
	LM-H2S10-480-4SS0	Length: 480mm		
	LM-H2S10-768-4SS0	Length: 768mm		
	LM-H2S20-288-1SS0	Length: 288mm		
	LM-H2S20-384-1SS0	Length: 384mm		
	LM-H2S20-480-1SS0	Length: 480mm		
	LM-H2S20-768-1SS0	Length: 768mm		
	LM-H2S30-288-1SS0	Length: 288mm		
	LM-H2S30-384-1SS0	Length: 384mm		
	LM-H2S30-480-1SS0	Length: 480mm		
LM-H2S30-768-1SS0	Length: 768mm			

Equipment configurations

Item	Model	Description
LM-F series linear servo motor Primary side (coil)	LM-FP2B-06M-1SS0	Continuous thrust: 300N (self-cooling) or 600N (liquid-cooling). Maximum thrust: 1800N
	LM-FP2D-12M-1SS0	Continuous thrust: 600N (self-cooling) or 1200N (liquid-cooling). Maximum thrust: 3600N
	LM-FP2F-18M-1SS0	Continuous thrust: 900N (self-cooling) or 1800N (liquid-cooling). Maximum thrust: 5400N
	LM-FP4B-12M-1SS0	Continuous thrust: 600N (self-cooling) or 1200N (liquid-cooling). Maximum thrust: 3600N
	LM-FP4D-24M-1SS0	Continuous thrust: 1200N (self-cooling) or 2400N (liquid-cooling). Maximum thrust: 7200N
	LM-FP4F-36M-1SS0	Continuous thrust: 1800N (self-cooling) or 3600N (liquid-cooling). Maximum thrust: 10800N
	LM-FP4H-48M-1SS0	Continuous thrust: 2400N (self-cooling) or 4800N (liquid-cooling). Maximum thrust: 14400N
LM-F series linear servo motor Secondary side (magnet)	LM-FS20-480-1SS0	Length: 480mm
	LM-FS20-576-1SS0	Length: 576mm
	LM-FS40-480-1SS0	Length: 480mm
	LM-FS40-576-1SS0	Length: 576mm
	LM-FS50-480-1SS0	Length: 480mm
	LM-FS50-576-1SS0	Length: 576mm
LM-U2 series linear servo motor Primary side (coil)	LM-U2PAB-05M-0SS0	Continuous thrust: 50N. Maximum thrust: 150N
	LM-U2PAD-10M-0SS0	Continuous thrust: 100N. Maximum thrust: 300N
	LM-U2PAF-15M-0SS0	Continuous thrust: 150N. Maximum thrust: 450N
	LM-U2PBB-07M-1SS0	Continuous thrust: 75N. Maximum thrust: 225N
	LM-U2PBD-15M-1SS0	Continuous thrust: 150N. Maximum thrust: 450N
	LM-U2PBF-22M-1SS0	Continuous thrust: 225N. Maximum thrust: 675N
	LM-U2P2B-40M-2SS0	Continuous thrust: 400N. Maximum thrust: 1600N
	LM-U2P2C-60M-2SS0	Continuous thrust: 600N. Maximum thrust: 2400N
LM-U2 series linear servo motor Secondary side (magnet)	LM-U2SA0-240-0SS0	Length: 240mm
	LM-U2SA0-300-0SS0	Length: 300mm
	LM-U2SA0-420-0SS0	Length: 420mm
	LM-U2SB0-240-1SS0	Length: 240mm
	LM-U2SB0-300-1SS0	Length: 300mm
	LM-U2SB0-420-1SS0	Length: 420mm
	LM-U2S20-300-2SS0	Length: 300mm
Optional regeneration unit	MR-RB032	Tolerable regeneration power: 30W. Resistance value: 40Ω
	MR-RB12	Tolerable regeneration power: 100W. Resistance value: 40Ω
	MR-RB30	Tolerable regeneration power: 300W. Resistance value: 13Ω
	MR-RB31	Tolerable regeneration power: 300W. Resistance value: 6.7Ω
	MR-RB32	Tolerable regeneration power: 300W. Resistance value: 40Ω
	MR-RB50	Tolerable regeneration power: 500W. Resistance value: 13Ω
	MR-RB51	Tolerable regeneration power: 500W. Resistance value: 6.7Ω
	MR-RB5E	Tolerable regeneration power: 500W (800W with fan). Resistance value: 6Ω
	MR-RB9P	Tolerable regeneration power: 850W (1300W with fan). Resistance value: 4.5Ω
MR-RB6K-4	Tolerable regeneration power: 850W (1300W with fan). Resistance value: 10Ω. For 400VAC	
MR Configurator (Setup software)	MRZJW3-SETUP221E	Servo setup software for personal computer

List of compatible software versions

Software	Compatible software version
Servo setup software MR Configurator (MRZJW3-SETUP221E)	MR-J3-20B-RJ004U□ to 700B-RJ004U□: B1 or above MR-J3-11KB-RJ004U□ to 22KB4-RJ004U□: C0 or above Note that software version C1 or above will be compatible when using MELSOFT MT Works2 (available soon).
Integrated start-up support software MT Developer (SW6RNC-GSVPROE/-GSVSETE)	00N or above
Integrated start-up support software MELSOFT MT Works2 (Available soon)	Any version
Q173DCPU/Q172DCPU OS software (SW8DNC-SV13□□/-SV22□□)	Any version
Q173HCPU/Q172HCPU OS software (SW6RN-SV13□□/-SV22□□)	00D or above

QD75MH with product information, 08032000000000-B or above is compatible with linear servo.

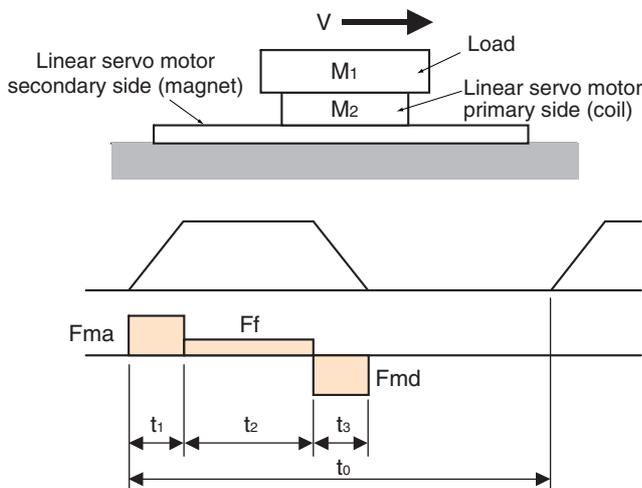
Selecting linear servo

- Linear servo must be selected according to the purpose of the application.
Select the optimal linear servo after completely understanding the characteristics of the guides, linear encoders and linear servo motors.
- Maximum velocity
The maximum velocity of the linear servo motor is 2m/s.
Note that the maximum velocity may not be able to reach 2m/s, depending on the type of linear encoder selected.

Selecting motors

- Continuous effective load thrust and necessary maximum thrust during acceleration or deceleration should be calculated from machine data and operation pattern. Then, a suitable linear servo motor can be selected.
In this catalog, the linear servo motor is selected according to a linear acceleration/deceleration operation pattern.

■ Configurations



- M₁ : Load mass (kg)
- M₂ : Linear servo motor primary side (coil) mass (kg)
- a : Acceleration (m/s²)
- F_f : Load power (N)
(including friction, unbalance and cable chain)
- V : Maximum velocity (m/s)
- t₀ : 1 cycle time (s)
- t₁ : Acceleration time (s)
- t₂ : Rated time (s)
- t₃ : Deceleration time (s)
- η : Mechanical efficiency
- μ : Coefficient of friction

■ Selection procedures

1. Iterative method of selecting linear servo motor (theoretical figure)

- Select linear servo motor

From the linear servo motor series that is suitable for your application or machine, tentatively select a linear servo motor which has a mass ratio of 30 times or less between the linear servo motor's primary side (coil) and load. (Note 1)

$$30 \text{ times} \geq M_1 / M_2 \text{ (Note 1)}$$

- Calculate necessary thrust

(1) Load power

$$M = M_1 + M_2 \text{ (kg)}$$

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

(2) Thrust during acceleration and deceleration

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

$$F_{md} = -M \cdot a + F_f \text{ (N)}$$

(3) Continuous effective load thrust

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

- Qualify selected motor

$$F_{rms} / \eta \leq \text{Rated thrust [n]} \text{ of current iteration's motor}$$

$$F_{ma} / \eta \leq \text{Maximum thrust [n]} \text{ of current iteration's motor}$$

If the above conditions are not satisfied, select 1 rank larger capacity linear servo motor and recalculate.

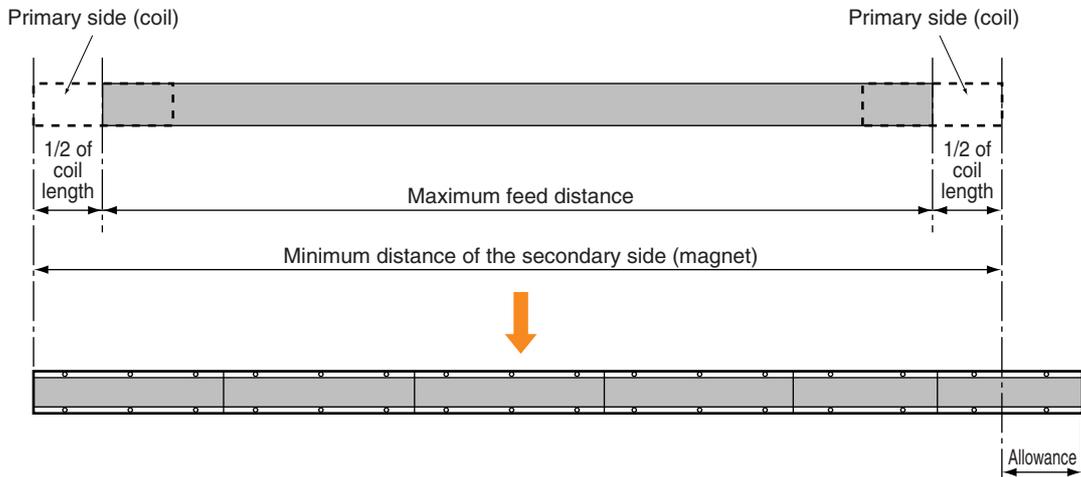
Notes: 1. The ratio of 30 times applies for LM-H2 and LM-U2 series.

When using LM-F series, tentatively select a linear servo motor which has a ratio of 15 times or less.

2. Determining the number of secondary side (magnet) elements

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

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



Note: When aligning two or more secondary sides (magnets), cumulative tolerance of the mounting hole must be $\pm 0.2\text{mm}$ or less. Therefore, spaces may exist between each secondary side (magnet) element.

3. Selecting optional regeneration unit

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 regenerative resistance is calculated as follows:

$$\text{Regenerative energy } P(W) = (-Fmd \cdot t_3 \cdot (\text{speed}/2) \cdot (\text{inverse efficiency}/100) - \text{Capacitor charging}) / t_0$$

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

Servo amplifier MR-J3-	Capacitor charging (J)	Inverse efficiency (%)	Tolerable regeneration power (W)											
			Built-in regenerative resistor	External regenerative resistor (standard accessory)	Optional regeneration unit MR-RB									
					032 [40Ω]	12 [40Ω]	30 [13Ω]	31 [6.7Ω]	32 [40Ω]	50 [13Ω] (Note 1)	51 [6.7Ω] (Note 1)	5E [6Ω] (Note 2)	9P [4.5Ω] (Note 2)	6K-4 [10Ω] (Note 2)
20B-RJ004U□	9	70	10	—	30	100	—	—	—	—	—	—	—	—
40B-RJ004U□	11	85	10	—	30	100	—	—	—	—	—	—	—	—
60B-RJ004U□	11	85	10	—	30	100	—	—	—	—	—	—	—	—
70B-RJ004U□	18	80	20	—	30	100	—	—	300	—	—	—	—	—
200B-RJ004U□	40	85	100	—	—	—	300	—	—	500	—	—	—	—
350B-RJ004U□	40	85	100	—	—	—	300	—	—	500	—	—	—	—
500B-RJ004U□	45	90	130	—	—	—	—	300	—	—	500	—	—	—
700B-RJ004U□	70	90	170	—	—	—	—	300	—	—	500	—	—	—
11KB-RJ004U□	120	90	—	500 (800)	—	—	—	—	—	—	—	500 (800)	—	—
15KB-RJ004U□	170	90	—	850 (1300)	—	—	—	—	—	—	—	—	850 (1300)	—
22KB4-RJ004U□	250	90	—	850 (1300)	—	—	—	—	—	—	—	—	—	850 (1300)

Notes: 1. Be sure to install a cooling fan. The cooling fan must be prepared by user.

2. The values in () indicate when cooling fans (2 units of $92 \times 92\text{mm}$, minimum air flow: $1.0\text{m}^3/\text{min}$) are installed, and the parameter No. PA02 is changed.

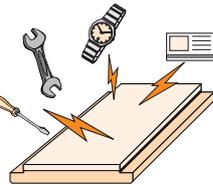
To ensure safe use

- To use the products given in this catalog properly, always read the "Installation Guide" and "MR-J3-□B-RJ004U□ INSTRUCTION MANUAL" before starting to use them.
- These products have been manufactured as a general-purpose part for general industries, and have not been designed or manufactured to be incorporated in a device or system used in purposes related to human life.
- Before using the products for special purposes such as nuclear power, electric power, aerospace, medicine, passenger movement vehicles or underwater relays, contact Mitsubishi.
- These products have been manufactured under strict quality control. However, when installing the product where major accidents or losses could occur if the product fails, install appropriate backup or failsafe functions in the system.

Cautions concerning use

Handling linear servo

- The linear servo system uses a powerful magnet on the secondary side. Magnetic force is inversely proportional to the square of the distance from the magnetic material. Therefore, the magnetic force will be drastically stronger as closer to the magnetic material. Persons installing as well as operating the linear servo motor must be fully cautious when handling the machine. Persons with pacemakers or other medical devices must keep away from the machine.
- Do not carry products that may malfunction or fail due to the magnetic force such as watches, cell phones and calculators, and avoid wearing metals such as earrings or necklaces when handling the machine.
- Place a sign such as "CAUTION! POWERFUL MAGNET" to give warning against the machine.
- Use non-magnetic tools when installing or working near the linear servo motor.
e.g., Explosion-proof beryllium copper alloy safety tools: bealon (NGK Insulators, Ltd.)
- The permanent magnet on the secondary side generates a force to attract magnetic objects. Use caution to prevent your hands from being caught. Take extra caution especially when installing the primary side (coil) after installing the secondary side (magnet).
- Measures must be taken to prevent magnetic powder or magnetic pieces from being attracted to the permanent magnet on the secondary side.
- Replace the linear servo motor when it is damaged.
- Do not touch the linear servo motor with wet hands.



Installation

- Combinations of the linear servo motor and servo amplifier are predetermined. Confirm the models of the linear servo motor and servo amplifier to be used before installation.
 - Use the linear servo motor in the designated environment.
 - Do not drop or apply strong impact on the servo amplifier and the linear servo motor as they are precision devices and may be damaged from such stress or shock.
 - Avoid installation in an environment in which oil mist, dust, etc. are in the air. When using in such an environment, enclose the servo amplifier in a sealed panel. Protect the motor by furnishing a cover for it or taking similar measures.
 - Do not use where the linear servo motor could be constantly subject to cutting fluid or lubricant, or where dew could condense because of oil mist, overcooling or excessive humidity. These could cause the linear servo motor's insulation to deteriorate.
 - The linear servo motor's protection level is IP00. Provide measures to prevent dust and oil, etc., as necessary.
 - Mount the servo amplifier and linear servo motor on non-combustible material. Mounting them directly on or near flammable material could result in fires.
 - Mount the amplifier vertically on a wall.
 - When installing several amplifiers in a row in a sealed panel, leave 10mm or more open between each amplifier. The MR-J3-350B-RJ004U□ or smaller servo amplifier can be installed closely. In this case, keep the ambient temperature within 0 to 45°C (32 to 113°F), or use them with 75% or less of the effective load rate.
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- When using one amplifier, always leave 40mm or more open in the upward and downward directions. To ensure the life and reliability, keep space as open as possible toward the top plate so that heat does not build up.
 - Take special care, especially when installing several amplifiers in a row.
 - The optional regeneration unit becomes hot (a temperature rise of 100°C or more) with frequent use. Do not install within flammable objects or objects subject to thermal deformation. Take care to ensure that electrical wires do not come into contact with the unit.
 - Do not get on or place heavy objects on the linear servo motor. There is a risk of injury.
 - Do not modify the linear servo motor.
 - The magnetic pole cannot be detected when mounted on a vertical axis, so do not use the linear servo motor for a vertical axis applications.
 - Provide a mechanism that can withstand high speeds and high acceleration / deceleration.
 - To enable high-accuracy positioning, ensure the machine's rigidity, and keep the machine's resonance point at a high level.
 - Securely fix the linear servo motor onto the machine. Insufficient fixing could cause the linear servo motor to dislocate during operation.
 - Install electrical and mechanical stoppers at the stroke end.
 - Install your system so that the center of gravity of the moving section comes directly above the center of the primary side (coil).
 - If the linear encoder is improperly mounted, an alarm or a positioning deviation may occur. In this case, refer to the following general inspection of the linear encoder to verify the mounting state.
 - General inspection of linear encoder
 - Verify that the gap between the linear encoder's head and linear encoder is appropriate.
 - Check for any rolling or yawing (looseness) on the linear encoder head.
 - Check for contaminations and scratches on the linear encoder's head and scale surface.
 - Verify that vibration and temperature are within the specified range.
 - Verify that the speed does not exceed the tolerable range due to overshooting.

Note: Contact the relevant linear encoder manufacturers for detailed confirmation items.

Grounding

- Securely ground to prevent electric shocks and to stabilize the potential in the control circuit.
- To ground the linear servo motor and servo amplifier at one point, connect the grounding terminals of each unit, and ground from the servo amplifier side.
- Faults such as a deviation in position may occur if the grounding is insufficient.

Wiring

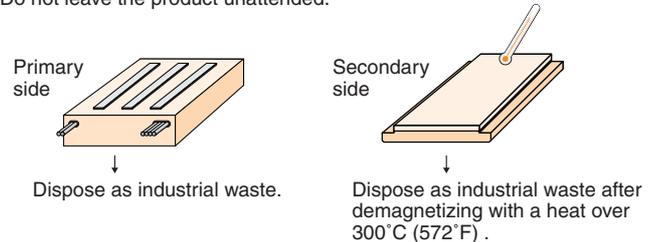
- When a commercial power supply is applied to the servo amplifier's output terminals (U, V, W), the servo amplifier will be damaged. Before switching the power on, perform thorough wiring and sequence checks to ensure that there are no wiring errors, etc.
- When a commercial power supply is applied to the linear servo motor's input terminals (U, V, W), the linear servo motor will be damaged. Connect the linear servo motor to the servo amplifier's output terminals (U, V, W).
- Match the phase of the linear servo motor's input terminals (U, V, W) to the servo amplifier's output terminals (U, V, W) before connecting. If they are not the same, the linear servo motor cannot be controlled.
- The power cables, etc., protruding from the primary side (coil) cannot withstand bending operation for long periods of time. Fix these cables to the moving section, etc., so that they do not bend.
- Do not apply excessive tension on the fiber-optic cable when cabling.
- The minimum bending radius of the fiber-optic cable is 25mm for MR-J3BUS□M and 50mm for MR-J3BUS□M-A/B. If using these cables under the minimum bending radius, performance cannot be guaranteed.
- If the ends of the fiber-optic cable are dirty, the light will be obstructed, resulting in malfunctions. Always clean the ends if dirty.
- Do not tighten the fiber-optic cable with cable ties, etc.
- Do not directly look at the light when the fiber-optic cable is not connected.
- Carefully consider the cable clamping method, and make sure that bending stress and the stress of the cable's own weight are not applied on the cable connection section.

Operation

- When a magnetic contactor (MC) is installed on the servo amplifier's primary side, do not perform frequent starts and stops with the MC. Doing so may cause the servo amplifier to fail.
- When trouble occurs, the servo amplifier's safety features will be activated, halting output, and the dynamic brake instantly stops the linear servo motor.
- Validate the stroke end signals (LSP, LSN) in the position control or speed control mode. The linear servo motor will not start if the signals are invalid.
- If the servo amplifier's protection function activates, turn the power OFF immediately. Remove the cause before turning the power ON again. If operation is continued without removing the cause of the fault, the linear servo motor may malfunction and result in injury or damage.
- Do not use a servo amplifier or linear servo motor which is damaged or missing parts.
- Do not touch the linear servo motor during or after operation until it has had sufficient time to cool. The linear servo motor can be very hot, and severe burns may result from touching the motor.

Disposing linear servo motor

- Dispose of the primary side as industrial waste.
- Demagnetize the secondary side with a heat over 300°C (572°F) and dispose as industrial waste. If not possible to demagnetize, return the secondary side to us in an appropriate package.
- Do not leave the product unattended.



Warranty

1. Gratis warranty period and coverage

[Gratis warranty period]

Note that a period of less than one year after installation in your company or your customer's premises or within 18 months (counted from the date of production) after shipment from our company, whichever is shorter, is selected.

[Coverage]

- (1) Diagnosis of failure

As a general rule, diagnosis of failure is done on site by the customer.

- (2) Breakdown repairs

There will be a charge for breakdown repairs, exchange replacements and on site visits for the following four conditions.

- 1) Breakdowns due to improper storage or handling; careless accident; software/hardware design by your company and/or your customers.
- 2) Breakdowns due to modifications of the product without the consent of the manufacturer.
- 3) Breakdowns resulting from using the product outside the specified specifications of the product.
- 4) Breakdowns that are outside the terms of warranty.

Since the above services are limited to Japan, diagnosis of failures, etc. are not performed abroad.

For details, consult with Mitsubishi in advance.

2. Exclusion of opportunity loss from warranty liability

Regardless of the gratis warranty term, compensation for opportunity loss incurred to your company or your customers by failures of Mitsubishi products, for damages to the products other than Mitsubishi's or for other services are not covered under warranty.

3. Repair period after production is discontinued

Mitsubishi shall accept product repairs for seven years from the date of the products discontinuation.

4. Terms of delivery

Mitsubishi shall deliver the product to the customer, and Mitsubishi is not liable for on site adjustment or test run of the product.

 **Safety Warning**

To ensure proper use of the products listed in this catalog,
please be sure to read the instruction manual prior to use.

 **mitsubishi electric corporation**
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