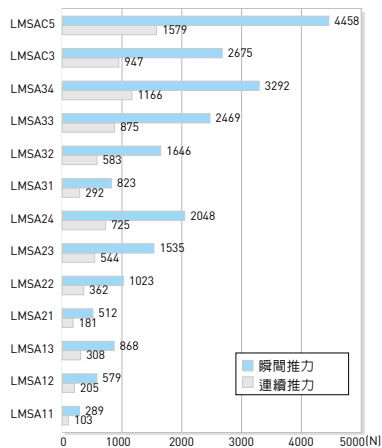


超薄型線性馬達

LMSA 系列



馬達推力圖



HIWIN 同步線性馬達 LMSA是屬於線性驅動產品中推力較大的一型。它的特色在於超高推力密度與低頓力。

此三相馬達是由鐵心構成的一次側(動子)與永久磁鐵構成的二次側(定子)組成。由於定子可無限延長，所以行程將不受限制。

- 薄型設計
- 高動態響應
- 低頓力
- 適度的磁吸力預壓
- 連續推力範圍103N至1579N
- 瞬間推力範圍289N至4458N

動子型號編碼說明

LM

SA

1

1

L

系列

LM: 線性馬達

型式

SA: 線性馬達型號

動子寬度

1: 56mm
2: 86mm
3: 116mm
C: 123.5mm

動子長度

1: 118 mm
2: 223 mm
3: 328 mm
4: 433 mm
5: 538 mm

繞線代碼

無: 標準品
L: 低反電動勢版

定子型號編碼說明

LM

SA

1

S

1

EA

系列

LM: 線性馬達

型式

SA: 線性馬達型號

定子寬度

1: 52 mm
2: 86 mm
3: 116 mm
C: 126 mm

定子型號

S: 標準品
C: 客製品

定子長度

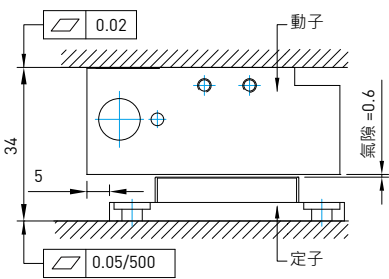
1: 120 mm
2: 180 mm
3: 300 mm

磁鐵封裝方式

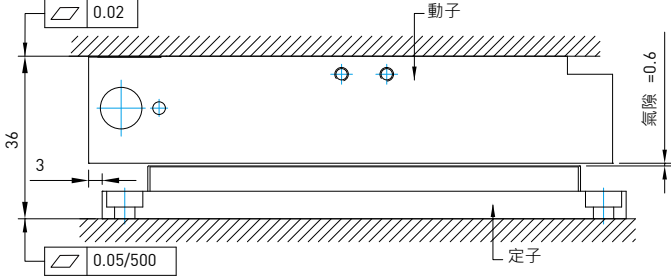
EA: 注膠式
無: 蓋板式

安裝公差

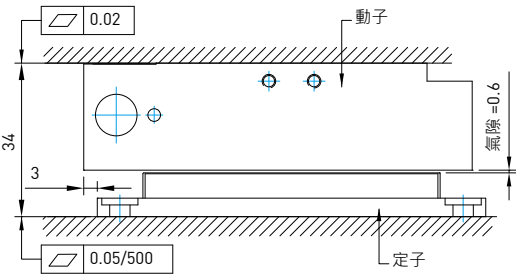
LMSA1



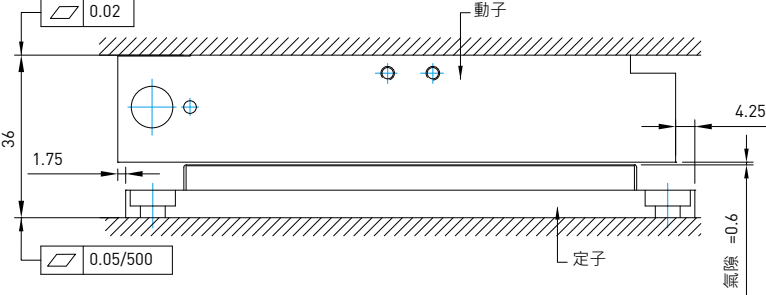
LMSA3



LMSA2



LMSAC



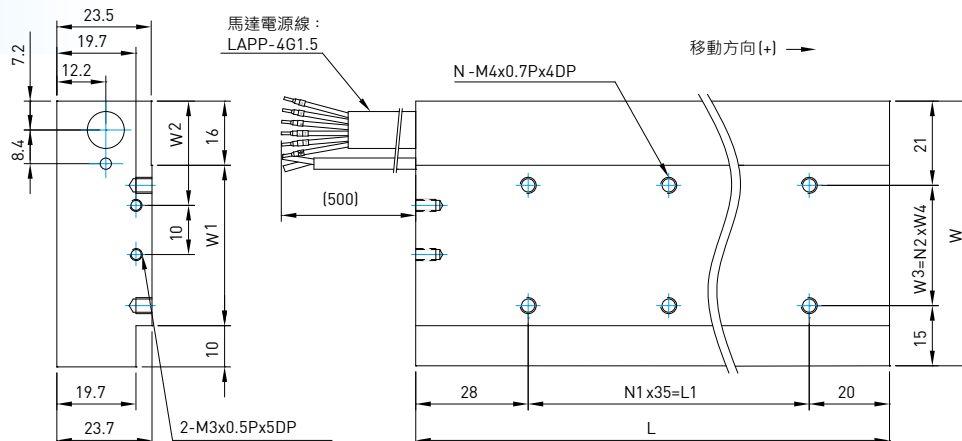
線性馬達規格

	符號	單位	LMSA11	LMSA11L	LMSA12	LMSA12L	LMSA13	LMSA13L	LMSA21	LMSA21L	LMSA22	LMSA22L	LMSA23	LMSA23L	LMSA24
連續推力	F _c	N	103	103	205	205	308	308	181	181	362	362	544	544	725
連續電流	I _c	A (rms)	2.1	4.7	4.2	9.4	6.3	14.1	2.0	4.4	3.9	8.8	5.9	13.1	7.8
瞬間推力(1s)	F _p	N	289	289	579	579	868	868	512	512	1023	1023	1535	1535	2048
瞬間電流(1s)	I _p	A (rms)	6.3	14.1	12.7	28.3	19.0	42.4	5.9	13.1	11.8	26.3	17.6	39.4	23.5
極限推力(0.25秒)	F _u	N	379	379	759	759	1138	1138	670	670	1341	1341	2011	2011	2682
極限電流(0.25秒)	I _u	A(rms)	10.6	23.6	21.1	47.1	31.7	70.7	9.8	21.9	19.6	43.8	29.4	65.7	39.2
推力常數	K _i	N/A (rms)	48.6	21.7	48.6	21.7	48.6	21.7	92.5	41.4	92.5	41.4	92.5	41.4	92.5
動子與定子間吸力	F _a	N	481	481	963	963	1444	1444	963	963	1926	1926	2888	2888	3851
線圈最高溫度	T _{max}	°C	120												
電氣時間常數	K _e	ms	4.4	4.3	4.5	4.1	4.4	4.0	4.6	4.6	4.9	4.6	4.9	4.8	4.6
電阻(線間, 25°C)	R ₂₅	Ω	8.4	1.7	4.1	0.9	2.8	0.6	13.8	2.8	6.8	1.4	4.6	0.9	3.5
電阻(線間, 120°C)	R ₁₂₀	Ω	11.6	2.3	5.7	1.2	3.9	0.8	19.0	3.9	9.4	1.9	6.3	1.2	4.8
電感(線間)	L	mH	37.1	7.3	18.5	3.7	12.4	2.4	64.0	12.8	33.0	6.4	22.4	4.3	16.0
極對距	2 τ	mm	30												
馬達線繞曲半徑	R _{bend}	mm	69												
反電動勢常數(線間)	K _v	Vrms/(m/s)	28.1	12.6	28.1	12.6	28.1	12.6	53.4	23.9	53.4	23.9	53.4	23.9	53.4
馬達常數(25°C)	K _m	N/√W	13.7	13.6	19.6	18.7	23.7	22.9	20.3	20.2	28.9	28.6	35.2	35.6	40.6
熱阻	R _{TH}	°C/W	1.23	1.23	0.63	0.63	0.41	0.41	0.87	0.87	0.44	0.44	0.29	0.29	0.22
熱時間常數	t _{TH}	s	1830	1830	2720	2720	4210	4210	2830	2830	4060	4060	5080	5080	-
熱感測開關	-	-	3 PTC SNM120 In Series												
最大操作電壓	V _{DC}	V	600												
動子質量	M _f	kg	0.7	0.7	1.4	1.4	2.1	2.1	1.1	1.1	2.2	2.2	3.3	3.3	4.4
定子單位質量	M _s	kg/m	2.7	2.7	2.7	2.7	2.7	2.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8
定子寬度	W _s	mm	52	52	52	52	52	52	86	86	86	86	86	86	86
定子長度/數值 N	L _s	mm	120mm/N=2, 180mm/N=3, 300mm/N=5												
定子固定孔位	W _{s1}	mm	42	42	42	42	42	42	74	74	74	74	74	74	74
總安裝高度	H	mm	34	34	34	34	34	34	34	34	34	34	34	34	34

	符號	單位	LMSA24L	LMSA31	LMSA31L	LMSA32	LMSA32L	LMSA33	LMSA33L	LMSA34	LMSA34L	LMSAC3	LMSAC3L	LMSAC5	LMSAC5L
連續推力	F _c	N	725	292	292	583	583	875	875	1166	1166	947	947	1579	1579
連續電流	I _c	A (rms)	17.5	2.0	4.5	4.0	8.9	6.0	13.4	8.0	17.9	6.0	13.4	10.0	22.3
瞬間推力(1s)	F _p	N	2048	823	823	1646	1646	2469	2469	3292	3292	2675	2675	4458	4458
瞬間電流(1s)	I _p	A (rms)	52.5	6.0	13.4	12.0	26.8	18.0	40.2	24.0	53.6	18.0	40.2	30.0	67.0
極限推力(0.25秒)	F _u	N	2682	1079	1079	2157	2157	3236	3236	4314	4314	3505	3505	5842	5842
極限電流(0.25秒)	I _u	A(rms)	87.6	10.0	22.3	20.0	44.7	30.0	67.0	40.0	89.4	30.0	67.0	50.0	111.7
推力常數	K _i	N/A (rms)	41.4	145.8	65.2	145.8	65.2	145.8	65.2	145.8	65.2	157.9	70.7	157.9	70.7
動子與定子間吸力	F _a	N	3851	1444	1444	2888	2888	4333	4333	5777	5777	4694	4694	7823	7823
線圈最高溫度	T _{max}	°C	120												
電氣時間常數	K _e	ms	4.7	4.9	4.9	4.9	4.9	4.9	5.0	4.9	4.9	5.0	5.0	5.0	5.0
電阻(線間, 25°C)	R ₂₅	Ω	0.7	19.2	4.0	9.6	2.0	6.4	1.3	4.8	1.0	6.8	1.4	4.1	0.8
電阻(線間, 120°C)	R ₁₂₀	Ω	0.9	26.5	5.5	13.2	2.8	8.8	1.8	6.6	1.3	9.4	1.9	5.7	1.1
電感(線間)	L	mH	3.2	94.1	19.6	47.1	9.8	31.3	6.5	23.5	4.7	33.8	6.8	20.3	4.1
極對距	2 τ	mm	30												
馬達線繞曲半徑	R _{bend}	mm	69												
反電動勢常數(線間)	K _v	Vrms/(m/s)	23.9	84.2	37.7	84.2	37.7	84.2	37.7	84.2	37.7	91.2	40.8	91.2	40.8
馬達常數(25°C)	K _m	N/√W	40.8	27.2	26.6	38.4	37.7	47.0	46.7	54.3	54.5	49.3	49.5	63.7	63.9
熱阻	R _{TH}	°C/W	0.22	0.60	0.60	0.30	0.30	0.20	0.20	0.15	0.15	0.19	0.19	0.11	0.11
熱時間常數	t _{TH}	s	-	4540	4540	5740	5740	5580	5580	-	-	-	-	-	-
熱感測開關	-	-	3 PTC SNM120 In Series												
最大操作電壓	V _{DC}	V	600												
動子質量	M _f	kg	4.4	1.9	1.9	3.8	3.8	5.7	5.7	7.6	7.6	6.3	6.3	10.5	10.5
定子單位質量	M _s	kg/m	4.8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	9.7	9.7	9.7	9.7
定子寬度	W _s	mm	86	116	116	116	116	116	116	116	116	126	126	126	126
定子長度/數值 N	L _s	mm	120mm/N=2, 180mm/N=3, 300mm/N=5												
定子固定孔位	W _{s1}	mm	74	104	104	104	104	104	104	104	104	114	114	114	114
總安裝高度	H	mm	34	36	36	36	36	36	36	36	36	36	36	36	36

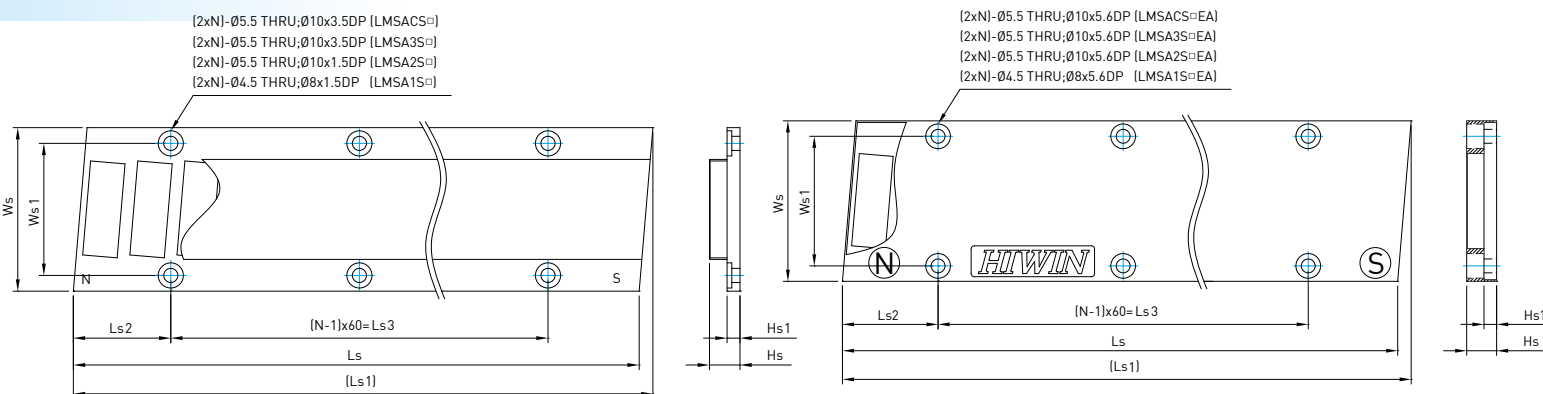
註：本表數據均為無強制冷卻下之值。
除了尺寸規格以外，其餘規格有±10%的誤差範圍。
本公司保有變更之權利，最終請依客戶承認圖為主。

動子尺寸



型號	L	L1	W	W1	W2	W3	W4	N	N1	N2
LMSA11	118	70	56	30	26	20	20	6	2	1
LMSA12	223	175	56	30	26	20	20	12	5	1
LMSA13	328	280	56	30	26	20	20	18	8	1
LMSA21	118	70	86	60	41	50	50	6	2	1
LMSA22	223	175	86	60	41	50	50	12	5	1
LMSA23	328	280	86	60	41	50	50	18	8	1
LMSA24	433	385	86	60	41	50	50	24	11	1
LMSA31	118	70	116	90	56	80	40	9	2	2
LMSA32	223	175	116	90	56	80	40	18	5	2
LMSA33	328	280	116	90	56	80	40	27	8	2
LMSA34	433	385	116	90	56	80	40	36	11	2
LMSAC3	328	280	123.5	97.5	59.75	80	40	27	8	2
LMSAC5	538	490	123.5	97.5	59.75	80	40	45	14	2

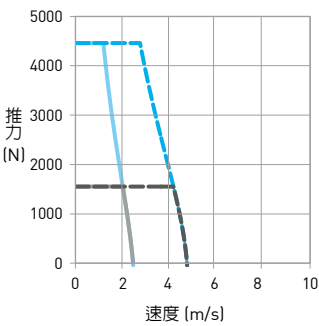
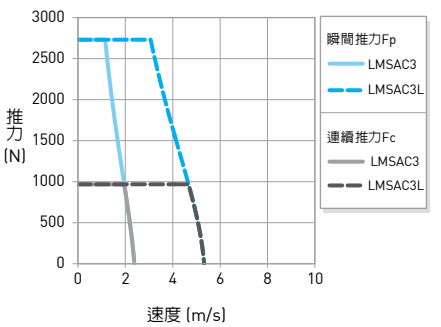
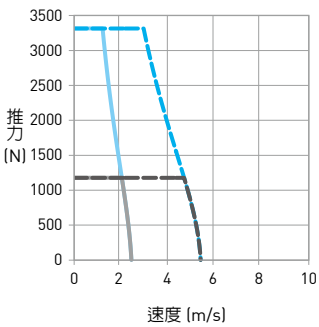
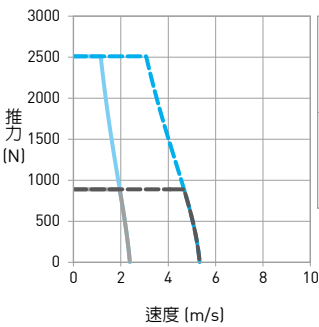
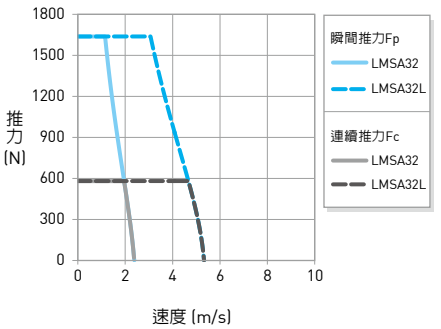
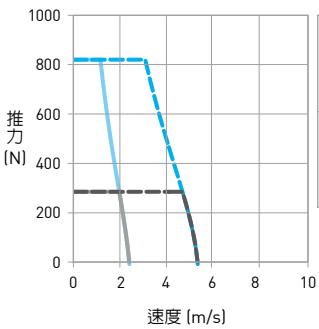
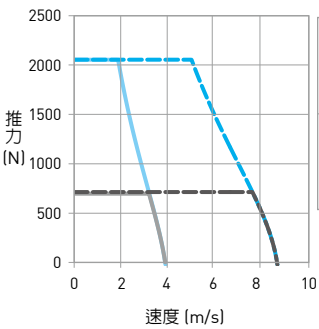
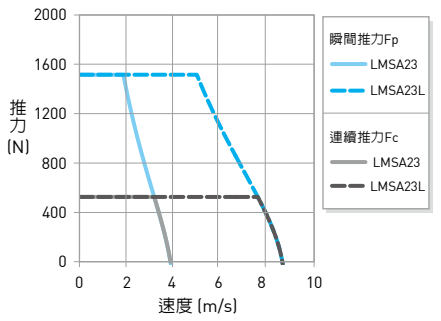
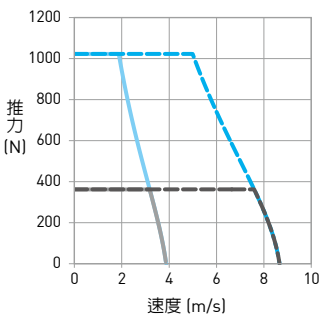
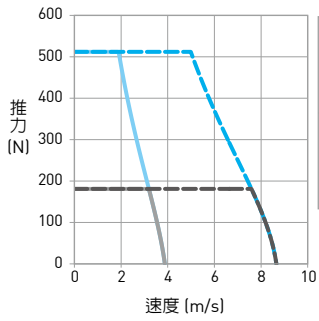
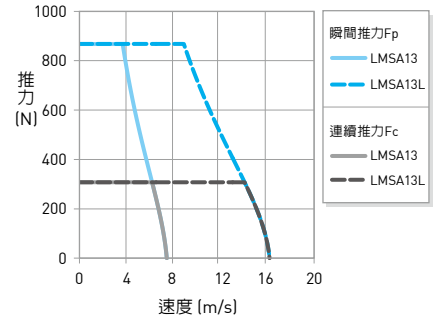
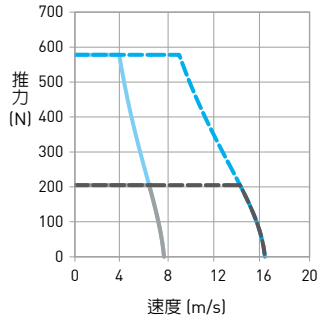
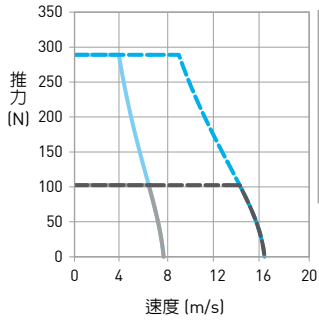
定子尺寸



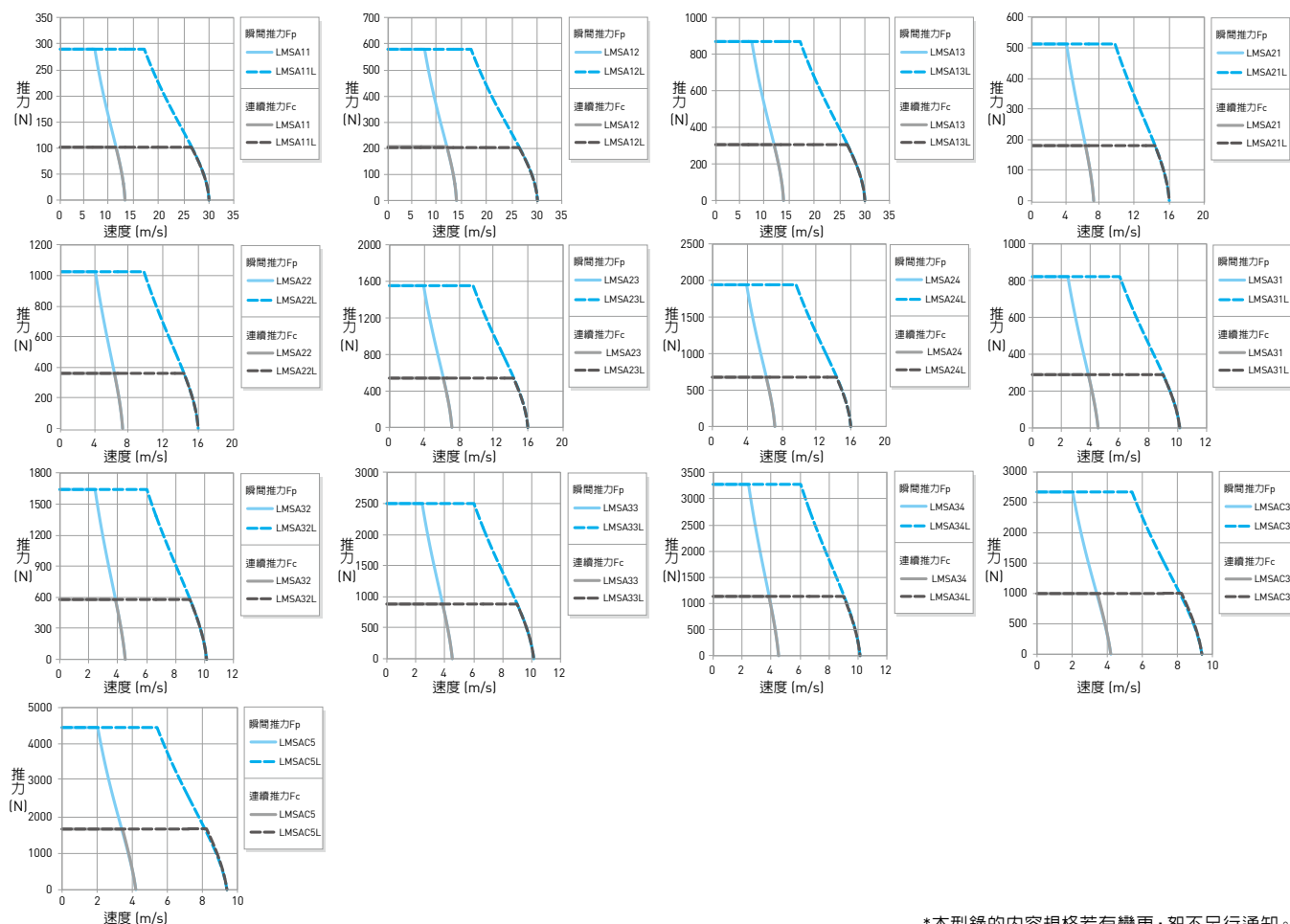
型號	Ls	Ls1	Ls2	Ls3	Ws	Ws1	Hs	Hs1	N
LMSA1S1(EA)	120	124.36	31	60	52	42	9.7	4.1	2
LMSA1S2(EA)	180	184.36	31	120	52	42	9.7	4.1	3
LMSA1S3(EA)	300	304.36	31	240	52	42	9.7	4.1	5
LMSA2S1(EA)	120	122.7	30.57	60	86	74	9.7	4.1	2
LMSA2S2(EA)	180	182.7	30.57	120	86	74	9.7	4.1	3
LMSA2S3(EA)	300	302.7	30.57	240	86	74	9.7	4.1	5
LMSA3S1(EA)	120	123.04	30.37	60	116	104	11.7	6.1	2
LMSA3S2(EA)	180	183.04	30.37	120	116	104	11.7	6.1	3
LMSA3S3(EA)	300	303.04	30.37	240	116	104	11.7	6.1	5
LMSACS1(EA)	120	123.3	30.37	60	126	114	11.7	6.1	2
LMSACS2(EA)	180	183.3	30.37	120	126	114	11.7	6.1	3
LMSACS3(EA)	300	303.3	30.37	240	126	114	11.7	6.1	5

F-V曲線

■ 推力與速度曲線圖(DC bus voltage = 325 V_{DC})



■ 推力與速度曲線圖(DC bus voltage = 600 V_{DC})



*本型錄的內容規格若有變更，恕不另行通知。

HIWIN
Motion Control and System Technology

大銀微系統股份有限公司
HIWIN MIKROSYSTEM CORP.
40852台中市精密機械園區精科中路6號
Tel: (04)2355-0110
Fax: (04)2355-0123
www.hiwinmikro.tw
business@hiwinmikro.tw

海外廠

德國 歐芬堡
HIWIN GmbH
OFFENBURG, GERMANY
www.hiwin.de
www.hiwin.eu

日本 神戶・東京・名古屋・九州・
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KOBE・TOKYO・NAGOYA・KYUSHU・
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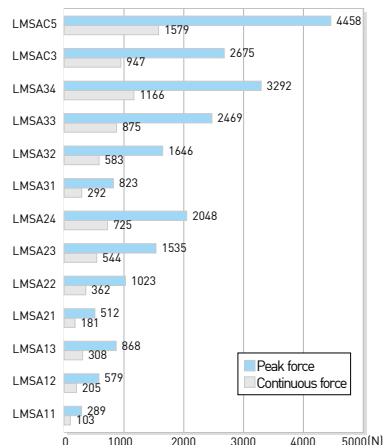
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以色列 海法
Mega-Fabs
Motion Systems, Ltd.
HAIFA, ISRAEL
www.mega-fabs.com

Extremely Low Profile Linear Motors, **LMSA** Series



Force Chart



HIWIN synchronous low profile linear motors LMSA are the power packs of linear drives, and especially distinguished by very high power density and minimum cogging force. This three-phase motor is composed of a primary part (forcer) with coiled stack of sheets and a secondary part (stators) with permanent magnets. With the combination of several stators, many stroke combinations are possible.

- Low profile and compact size
- High dynamic response
- Low cogging force
- Moderate magnetic attraction preload
- Continuous force from 103N to 1579N
- Peak force from 289N to 4458N

Structure of the order number of linear motors LMSA, forcer

Structure of the order number of linear motors LMSA, stator

LM SA 1 1 L

Series

LM: linear motor

Type

SA: linear motor type

Width of forcer

1: 56mm
2: 86mm
3: 116mm
C: 123.5mm

Length of forcer

1: 118 mm
2: 223 mm
3: 328 mm
4: 433 mm
5: 538 mm

Wiring code

N: Standard
L: Low back emf

LM SA 1 S 1 EA

Series

LM: linear motor

Type

SA: linear motor type

Width of stator

1: 52 mm
2: 86 mm
3: 116 mm
C: 126 mm

Stator model

S: Standard
C: Customized

Length of stator

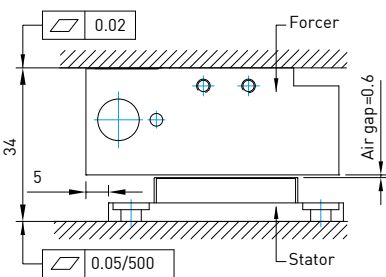
1: 120 mm
2: 180 mm
3: 300 mm

Cover for magnet

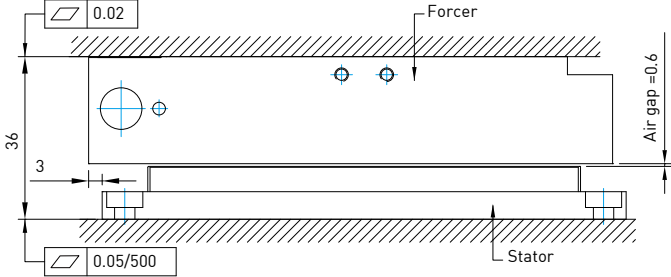
EA: Epoxy covered
None: Stainless plate

Mounting tolerance

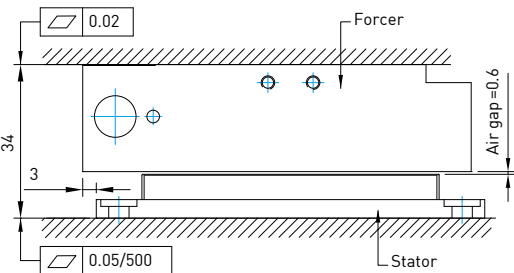
LMSA1



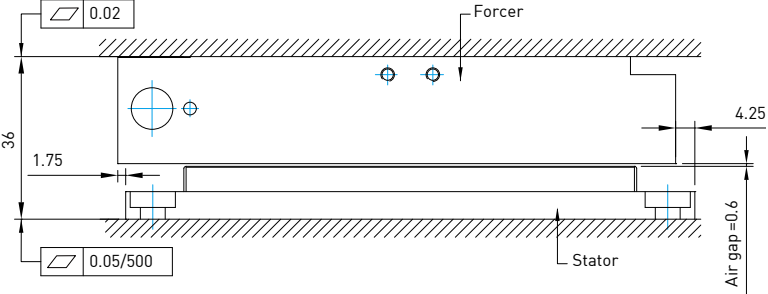
LMSA3



LMSA2



LMSAC



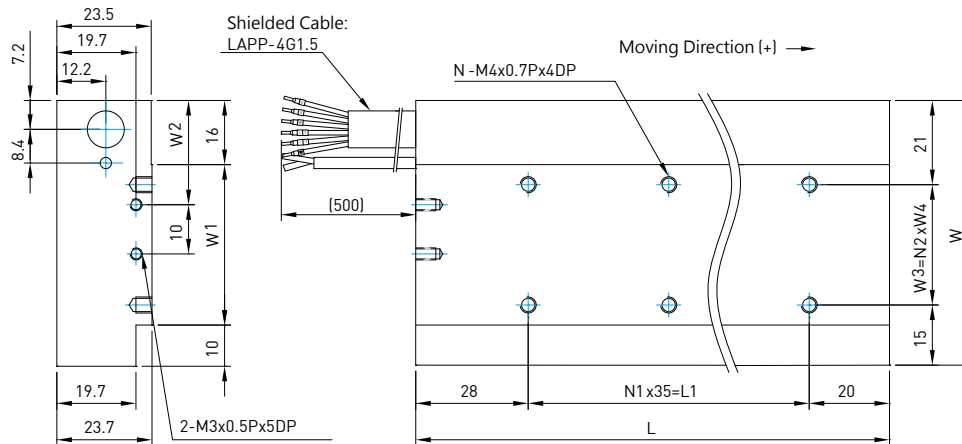
Specifications

	Symbol	Unit	LMSA11	LMSA11L	LMSA12	LMSA12L	LMSA13	LMSA13L	LMSA21	LMSA21L	LMSA22	LMSA22L	LMSA23	LMSA23L	LMSA24
Continuous force	F _c	N	103	103	205	205	308	308	181	181	362	362	544	544	725
Continuous current	I _c	A (rms)	2.1	4.7	4.2	9.4	6.3	14.1	2.0	4.4	3.9	8.8	5.9	13.1	7.8
Peak force (for 1 sec.)	F _p	N	289	289	579	579	868	868	512	512	1023	1023	1535	1535	2048
Peak current (for 1 sec.)	I _p	A (rms)	6.3	14.1	12.7	28.3	19.0	42.4	5.9	13.1	11.8	26.3	17.6	39.4	23.5
Ultimate force (for 0.25 sec.)	F _u	N	379	379	759	759	1138	1138	670	670	1341	1341	2011	2011	2682
Ultimate current (for 0.25 sec.)	I _u	A(rms)	10.6	23.6	21.1	47.1	31.7	70.7	9.8	21.9	19.6	43.8	29.4	65.7	39.2
Force constant	K _f	N/A (rms)	48.6	21.7	48.6	21.7	48.6	21.7	92.5	41.4	92.5	41.4	92.5	41.4	92.5
Attraction force	F _a	N	481	481	963	963	1444	1444	963	963	1926	1926	2888	2888	3851
Max. winding temp.	T _{max}	°C	120												
Electrical time constant	K _e	ms	4.4	4.3	4.5	4.1	4.4	4.0	4.6	4.6	4.9	4.6	4.9	4.8	4.6
Resistance (line to line at 25°C)	R ₂₅	Ω	8.4	1.7	4.1	0.9	2.8	0.6	13.8	2.8	6.8	1.4	4.6	0.9	3.5
Resistance (line to line at 120°C)	R ₁₂₀	Ω	11.6	2.3	5.7	1.2	3.9	0.8	19.0	3.9	9.4	1.9	6.3	1.2	4.8
Inductance (line to line)	L	mH	37.1	7.3	18.5	3.7	12.4	2.4	64.0	12.8	33.0	6.4	22.4	4.3	16.0
Pole pair pitch	2 τ	mm	30												
Minimum bending radius of cable	R _{bend}	mm	69												
Back emf constant (line to line)	K _v	Vrms/(m/s)	28.1	12.6	28.1	12.6	28.1	12.6	53.4	23.9	53.4	23.9	53.4	23.9	53.4
Motor constant (at 25°C)	K _m	N/√W	13.7	13.6	19.6	18.7	23.7	22.9	20.3	20.2	28.9	28.6	35.2	35.6	40.6
Thermal resistance	R _{TH}	°C/W	1.23	1.23	0.63	0.63	0.41	0.41	0.87	0.87	0.44	0.44	0.29	0.29	0.22
Thermal time constant	t _{TH}	s	1830	1830	2720	2720	4210	4210	2830	2830	4060	4060	5080	5080	-
Thermal switch	-	-	3 PTC SNM120 In Series												
Max. DC bus voltage	V _{DC}	V	600												
Mass of forcer	M _f	kg	0.7	0.7	1.4	1.4	2.1	2.1	1.1	1.1	2.2	2.2	3.3	3.3	4.4
Unit mass of stator	M _s	kg/m	2.7	2.7	2.7	2.7	2.7	2.7	4.8	4.8	4.8	4.8	4.8	4.8	4.8
Width of stator	W _s	mm	52	52	52	52	52	52	86	86	86	86	86	86	86
Length of stator/Dimension N	L _s	mm	120mm/N=2, 180mm/N=3, 300mm/N=5												
Stator mounting distance	W _{s1}	mm	42	42	42	42	42	42	74	74	74	74	74	74	74
Total height	H	mm	34	34	34	34	34	34	34	34	34	34	34	34	34

	Symbol	Unit	LMSA24L	LMSA31	LMSA31L	LMSA32	LMSA32L	LMSA33	LMSA33L	LMSA34	LMSA34L	LMSAC3	LMSAC3L	LMSAC5	LMSAC5L
Continuous force	F _c	N	725	292	292	583	583	875	875	1166	1166	947	947	1579	1579
Continuous current	I _c	A (rms)	17.5	2.0	4.5	4.0	8.9	6.0	13.4	8.0	17.9	6.0	13.4	10.0	22.3
Peak force (for 1 sec.)	F _p	N	2048	823	823	1646	1646	2469	2469	3292	3292	2675	2675	4458	4458
Peak current (for 1 sec.)	I _p	A (rms)	52.5	6.0	13.4	12.0	26.8	18.0	40.2	24.0	53.6	18.0	40.2	30.0	67.0
Ultimate force (for 0.25 sec.)	F _u	N	2682	1079	1079	2157	2157	3236	3236	4314	4314	3505	3505	5842	5842
Ultimate current (for 0.25 sec.)	I _u	A(rms)	87.6	10.0	22.3	20.0	44.7	30.0	67.0	40.0	89.4	30.0	67.0	50.0	111.7
Force constant	K _f	N/A (rms)	41.4	145.8	65.2	145.8	65.2	145.8	65.2	145.8	65.2	157.9	70.7	157.9	70.7
Attraction force	F _a	N	3851	1444	1444	2888	2888	4333	4333	5777	5777	4694	4694	7823	7823
Max. winding temp.	T _{max}	°C	120												
Electrical time constant	K _e	ms	4.7	4.9	4.9	4.9	4.9	4.9	5.0	4.9	4.9	5.0	5.0	5.0	5.0
Resistance (line to line at 25°C)	R ₂₅	Ω	0.7	19.2	4.0	9.6	2.0	6.4	1.3	4.8	1.0	6.8	1.4	4.1	0.8
Resistance (line to line at 120°C)	R ₁₂₀	Ω	0.9	26.5	5.5	13.2	2.8	8.8	1.8	6.6	1.3	9.4	1.9	5.7	1.1
Inductance (line to line)	L	mH	3.2	94.1	19.6	47.1	9.8	31.3	6.5	23.5	4.7	33.8	6.8	20.3	4.1
Pole pair pitch	2 τ	mm	30												
Minimum bending radius of cable	R _{bend}	mm	69												
Back emf constant (line to line)	K _v	Vrms/(m/s)	23.9	84.2	37.7	84.2	37.7	84.2	37.7	84.2	37.7	91.2	40.8	91.2	40.8
Motor constant (at 25°C)	K _m	N/√W	40.8	27.2	26.6	38.4	37.7	47.0	46.7	54.3	54.5	49.3	49.5	63.7	63.9
Thermal resistance	R _{TH}	°C/W	0.22	0.60	0.60	0.30	0.30	0.20	0.20	0.15	0.15	0.19	0.19	0.11	0.11
Thermal time constant	t _{TH}	s	-	4540	4540	5740	5740	5580	5580	-	-	-	-	-	-
Thermal switch	-	-	3 PTC SNM120 In Series												
Max. DC bus voltage	V _{DC}	V	600												
Mass of forcer	M _f	kg	4.4	1.9	1.9	3.8	3.8	5.7	5.7	7.6	7.6	6.3	6.3	10.5	10.5
Unit mass of stator	M _s	kg/m	4.8	8.5	8.5	8.5	8.5	8.5	8.5	8.5	8.5	9.7	9.7	9.7	9.7
Width of stator	W _s	mm	86	116	116	116	116	116	116	116	116	126	126	126	126
Length of stator/Dimension N	L _s	mm	120mm/N=2, 180mm/N=3, 300mm/N=5												
Stator mounting distance	W _{s1}	mm	74	104	104	104	104	104	104	104	104	114	114	114	114
Total height	H	mm	34	36	36	36	36	36	36	36	36	36	36	36	36

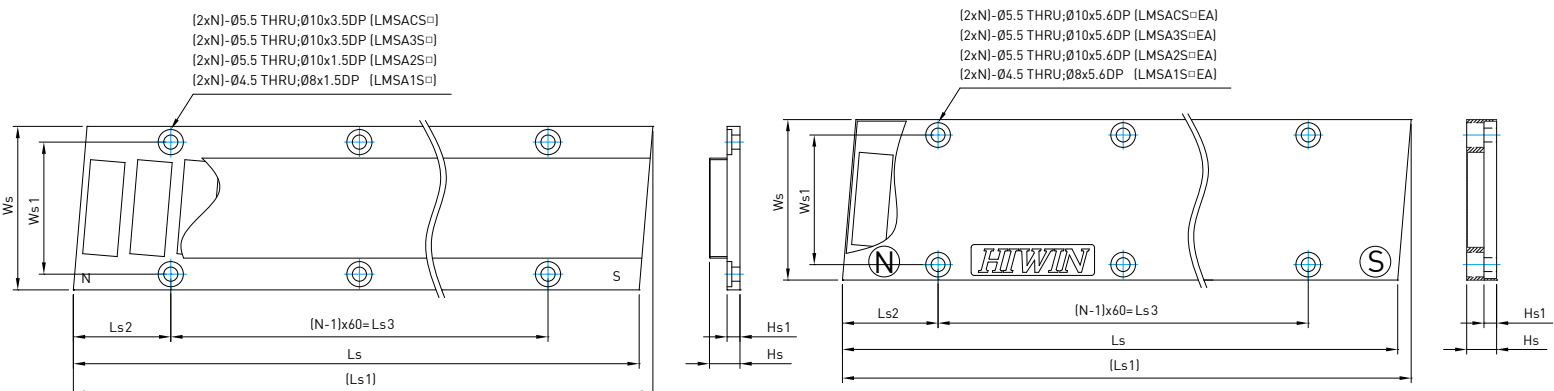
Note : Values in the table refer to operation without forced cooling.
Except dimensions, all the electrical specifications in the table are in ±10% of tolerance.
We keep the right to revise above content without prior notice.
Specification is based on the final drawing confirmed by the customer.

Dimensions of Forcer



Type	L	L1	W	W1	W2	W3	W4	N	N1	N2
LMSA11	118	70	56	30	26	20	20	6	2	1
LMSA12	223	175	56	30	26	20	20	12	5	1
LMSA13	328	280	56	30	26	20	20	18	8	1
LMSA21	118	70	86	60	41	50	50	6	2	1
LMSA22	223	175	86	60	41	50	50	12	5	1
LMSA23	328	280	86	60	41	50	50	18	8	1
LMSA24	433	385	86	60	41	50	50	24	11	1
LMSA31	118	70	116	90	56	80	40	9	2	2
LMSA32	223	175	116	90	56	80	40	18	5	2
LMSA33	328	280	116	90	56	80	40	27	8	2
LMSA34	433	385	116	90	56	80	40	36	11	2
LMSAC3	328	280	123.5	97.5	59.75	80	40	27	8	2
LMSAC5	538	490	123.5	97.5	59.75	80	40	45	14	2

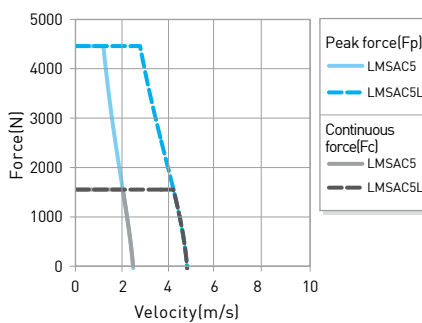
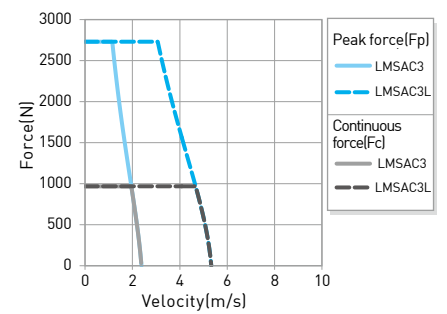
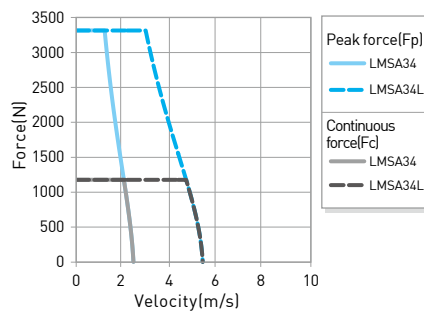
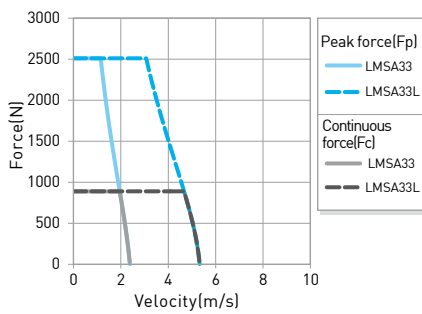
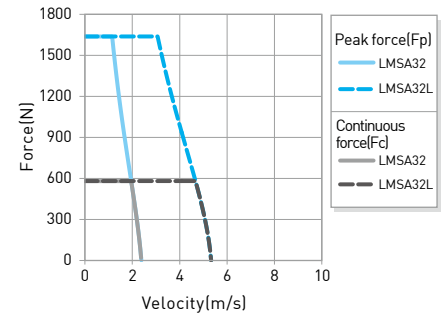
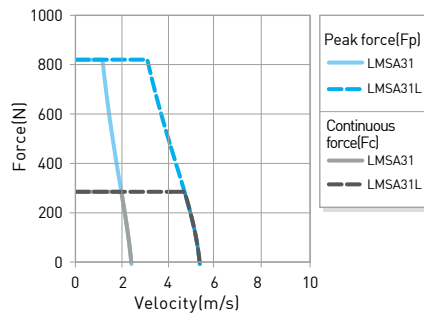
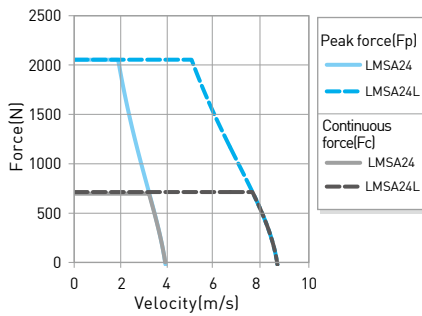
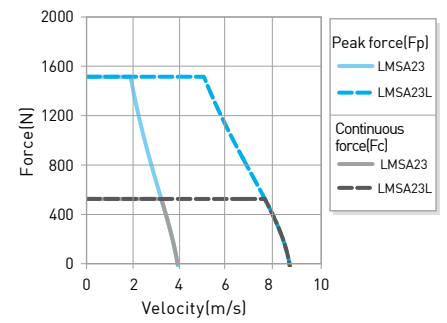
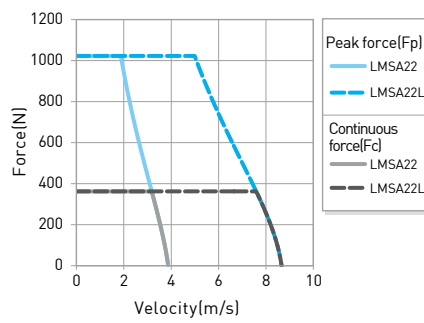
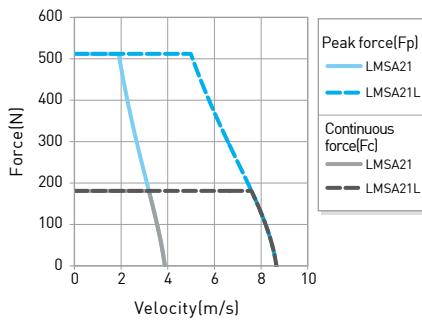
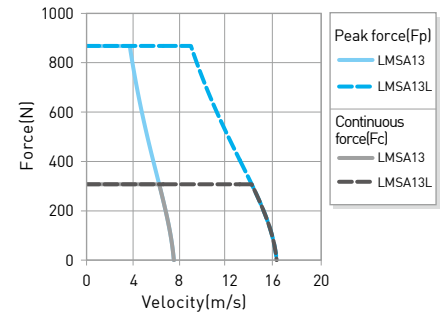
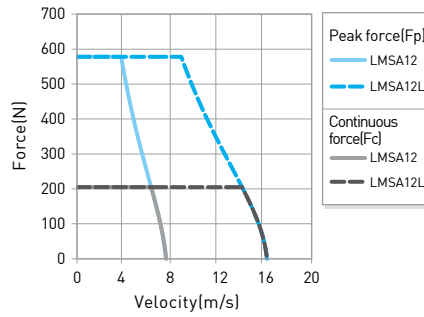
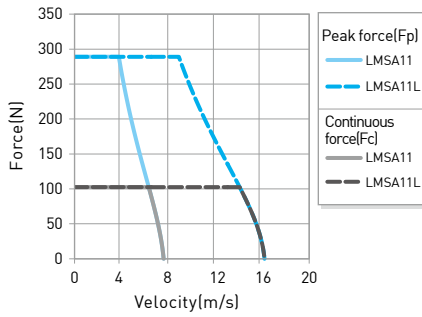
Dimensions of Stator



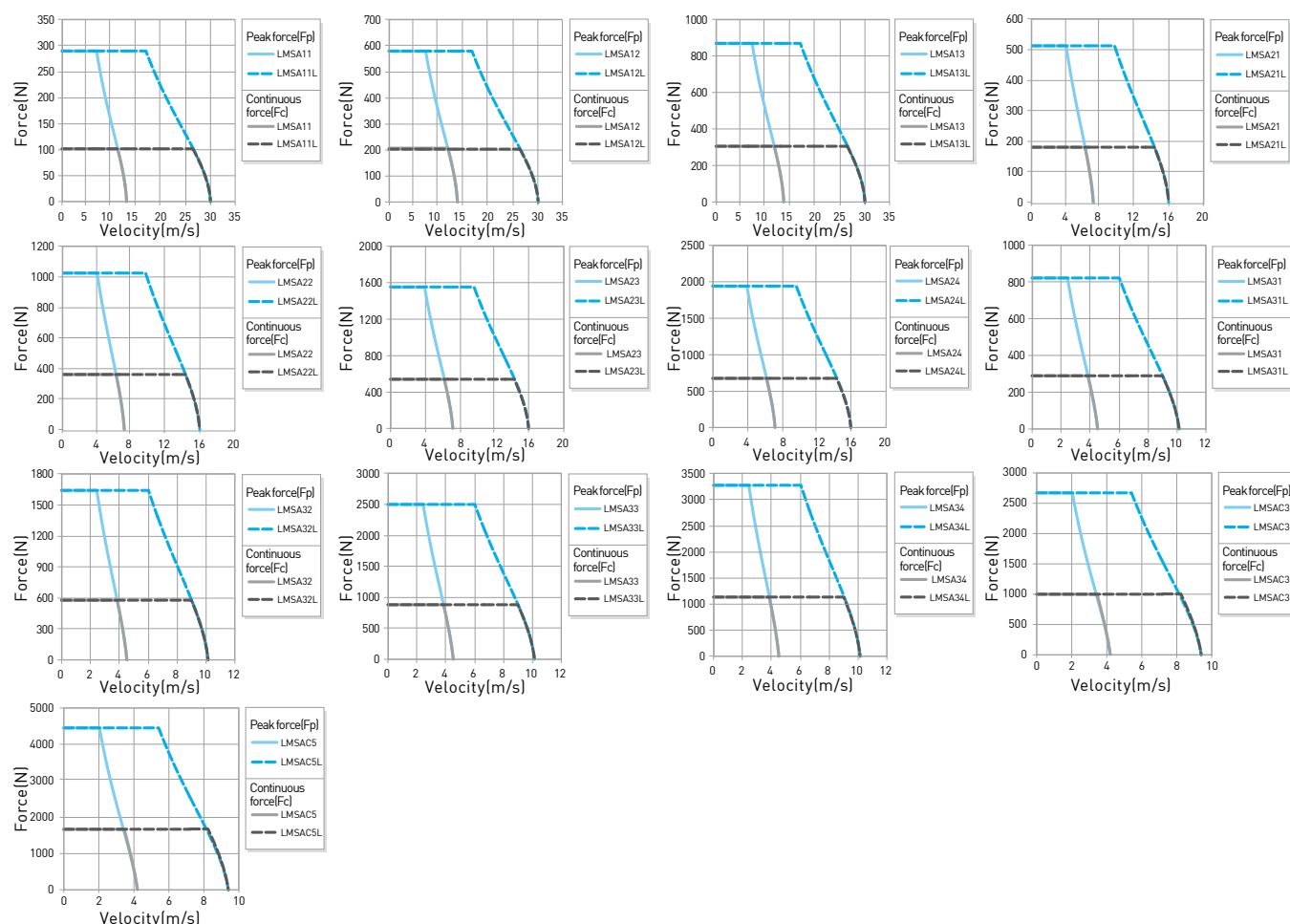
Type	Ls	Ls1	Ls2	Ls3	Ws	Ws1	Hs	Hs1	N
LMSA1S1(EA)	120	124.36	31	60	52	42	9.7	4.1	2
LMSA1S2(EA)	180	184.36	31	120	52	42	9.7	4.1	3
LMSA1S3(EA)	300	304.36	31	240	52	42	9.7	4.1	5
LMSA2S1(EA)	120	122.7	30.57	60	86	74	9.7	4.1	2
LMSA2S2(EA)	180	182.7	30.57	120	86	74	9.7	4.1	3
LMSA2S3(EA)	300	302.7	30.57	240	86	74	9.7	4.1	5
LMSA3S1(EA)	120	123.04	30.37	60	116	104	11.7	6.1	2
LMSA3S2(EA)	180	183.04	30.37	120	116	104	11.7	6.1	3
LMSA3S3(EA)	300	303.04	30.37	240	116	104	11.7	6.1	5
LMSACS1(EA)	120	123.3	30.37	60	126	114	11.7	6.1	2
LMSACS2(EA)	180	183.3	30.37	120	126	114	11.7	6.1	3
LMSACS3(EA)	300	303.3	30.37	240	126	114	11.7	6.1	5

F-V Curve

■ DC bus voltage = 325 V_{DC}



■ DC bus voltage = 600 V_{DC}



*The specifications in this catalog are subject to change without notification.

HIWIN
Motion Control and System Technology

HIWIN MIKROSYSTEM CORP.

No.6, Jingke Central Rd.,
Taichung Precision Machinery Park,
Taichung 40852, Taiwan
Tel: +886-4-23550110
Fax: +886-4-23550123
www.hiwinmikro.tw
business@hiwinmikro.tw

Subsidiaries & R&D Centers

HIWIN GmbH
OFFENBURG, GERMANY
www.hiwin.de
www.hiwin.eu
info@hiwin.de

HIWIN JAPAN
KOBE · TOKYO · NAGOYA · NAGANO ·
TOHOKU · HOKURIKU · HIROSHIMA ·
KUMAMOTO · FUKUOKA, JAPAN
www.hiwin.co.jp
info@hiwin.co.jp

HIWIN USA
CHICAGO · SILICON VALLEY, U.S.A.
www.hiwin.com
info@hiwin.com

HIWIN Srl
BRUGHERIO, ITALY
www.hiwin.it
info@hiwin.it

HIWIN Schweiz GmbH
JONA, SWITZERLAND
www.hiwin.ch
info@hiwin.ch

HIWIN FRANCE
ECHAUFFOUR, FRANCE
www.hiwin.fr
info@hiwin.fr

HIWIN s.r.o.
BRNO, CZECH REPUBLIC
www.hiwin.cz
info@hiwin.cz

HIWIN SINGAPORE
SINGAPORE
www.hiwin.sg
info@hiwin.sg

HIWIN KOREA
SOWON, KOREA
www.hiwin.kr
info@hiwin.kr

HIWIN CHINA
SUZHOU, CHINA
www.hiwin.cn
info@hiwin.cn

**Mega-Fabs Motion System,
Ltd.**

HAIFA, ISRAEL
www.mega-fabs.com
info@mega-fabs.com

Linear Motor

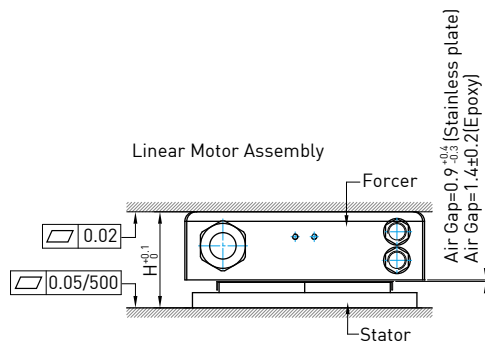
LMFA Series



HIWIN LMFA series are permanent-magnet synchronous linear motor with internal water-cooling system. Because of special electromagnetic and thermal design, LMFA series intrinsically own extremely large force density and the maximum peak force can exceed 20,000N. LMFA series are composed of a primary part (forcer) with core lamination and a secondary part (stator) with permanent magnets. The travel distance is unlimited and multi-forcers design is easily performed through the combination of several stators. LMFA series can be widely applied in Machine Center, PCB Industry and Active Mass Damper, etc .

- Internal water-cooling system
- Distinguished force density
- UL and CE certification
- Continuous force with water cooling from 149N to 7,917N
- Peak force from 282N to 20,827N
- Assembly total height 48.5mm, 50.5mm, 64.1mm and 66.1mm

Linear Motor Assembly

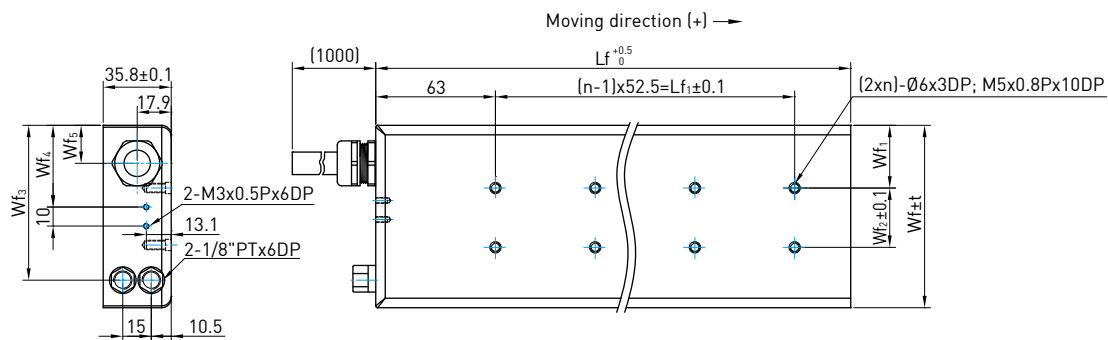


TYPE	H	TYPE	H	TYPE	H
LMFA01	48.5	LMFA31	64.1	LMFA52	64.1
LMFA02	48.5	LMFA32	64.1	LMFA53	64.1
LMFA03	48.5	LMFA33	64.1	LMFA54	64.1
LMFA11	48.5	LMFA34	64.1	LMFA62	66.1
LMFA12	48.5	LMFA41	66.1	LMFA63	66.1
LMFA13	48.5	LMFA42	66.1	LMFA64	66.1
LMFA14	48.5	LMFA43	66.1		
LMFA21	50.5	LMFA44	66.1		
LMFA22	50.5				
LMFA23	50.5				
LMFA24	50.5				

Structure of the order number of linear motors LMFA, forcer

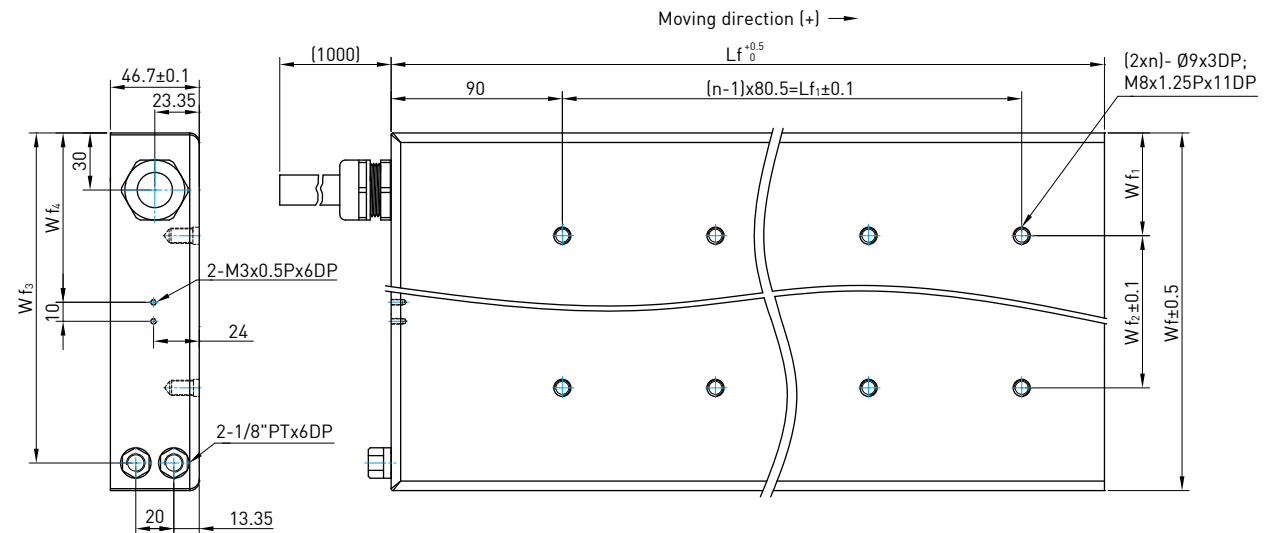
LM FA 3 1 L					
Series	Type	Width of forcer	Length of forcer		Wiring code
LM: linear motor	FA: linear motor type	0: 67mm 1: 96mm 2: 126mm 3: 141 mm 4: 188 mm 5: 248 mm 6: 342 mm	LMFA0~2 series 1:145mm 2:250mm 3:355mm 4:460mm	LMFA3~6 series 1:214mm 2:375mm 3:536mm 4:697mm	None:Standard L:Low back emf

• LMFA 0 , 1 , 2 Series --Forcer



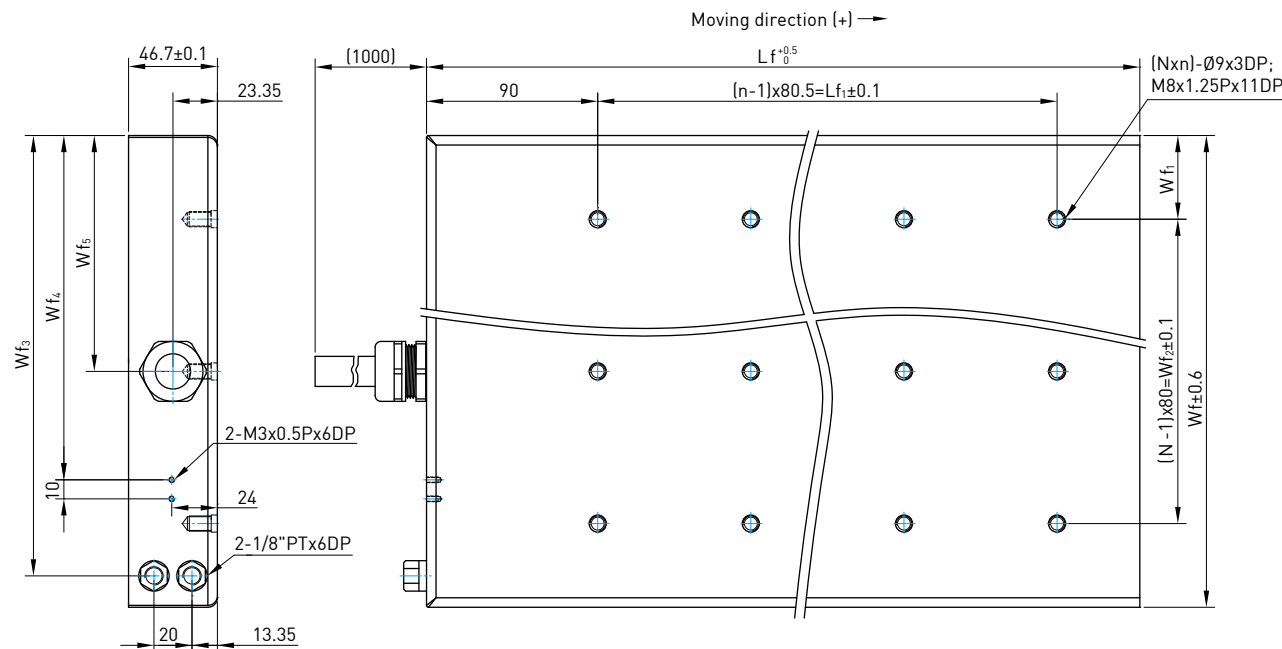
TYPE	Lf	Lf ₁	Wf	Wf ₁	Wf ₂	Wf ₃	Wf ₄	Wf ₅	n	t
LMFA01	145	52.5	67	18.5	30	55	33.75	14.4	2	0.3
LMFA02	250	157.5	67	18.5	30	55	33.75	14.4	4	0.3
LMFA03	355	262.5	67	18.5	30	55	33.75	14.4	6	0.3
LMFA11	145	52.5	96	33	30	81.5	43	20	2	0.4
LMFA12	250	157.5	96	33	30	81.5	43	20	4	0.4
LMFA13	355	262.5	96	33	30	81.5	43	20	6	0.4
LMFA14	460	367.5	96	33	30	81.5	43	20	8	0.4
LMFA21	145	52.5	126	40.5	45	111.5	58	20	2	0.4
LMFA22	250	157.5	126	40.5	45	111.5	58	20	4	0.4
LMFA23	355	262.5	126	40.5	45	111.5	58	20	6	0.4
LMFA24	460	367.5	126	40.5	45	111.5	58	20	8	0.4

● LMFA 3 , 4 Series --Forcer



TYPE	Lf	Lf ₁	Wf	Wf ₁	Wf ₂	Wf ₃	Wf ₄	n
LMFA31	214	80.5	141	40.5	60	126.5	65.5	2
LMFA32	375	241.5	141	40.5	60	126.5	65.5	4
LMFA33	536	402.5	141	40.5	60	126.5	65.5	6
LMFA34	697	563.5	141	40.5	60	126.5	65.5	8
LMFA41	214	80.5	188	54	80	173.5	89	2
LMFA42	375	241.5	188	54	80	173.5	89	4
LMFA43	536	402.5	188	54	80	173.5	89	6
LMFA44	697	563.5	188	54	80	173.5	89	8

● LMFA 5 , 6 Series --Forcer



TYPE	Lf	Lf ₁	Wf	Wf ₁	Wf ₂	Wf ₃	Wf ₄	Wf ₅	N	n
LMFA52	375	241.5	248	44	160	231.5	181	124	3	4
LMFA53	536	402.5	248	44	160	231.5	181	124	3	6
LMFA54	697	563.5	248	44	160	231.5	181	124	3	8
LMFA62	375	241.5	342	51	240	325.5	245	171	4	4
LMFA63	536	402.5	342	51	240	325.5	245	171	4	6
LMFA64	697	563.5	342	51	240	325.5	245	171	4	8

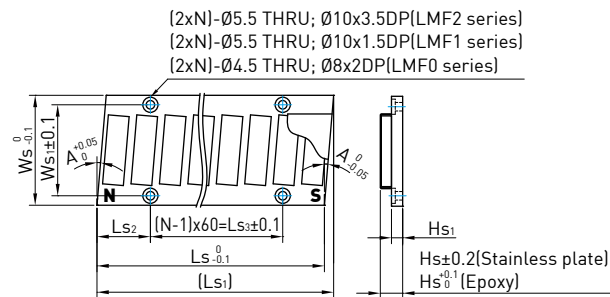
Structure of the order number of linear motors LMFA, stator

LMF 3 S 1 E				
Series	Width of stator	Stator model	Length of stator	Cover for magnet
	0:58mm 1:88mm 2:118mm 3: 134 mm 4: 180 mm 5: 240 mm 6: 334 mm	S: Standard C: Customized	LMF0~2 series 1:120mm 2:180mm 3:300mm LMF3~6 series 1: 184 mm 2: 276 mm 3: 460 mm	None: Stainless plate E: Epoxy covered

* LMFA forcer is collocated with LMF stator.

● LMFA 0, 1, 2 Series --Stator

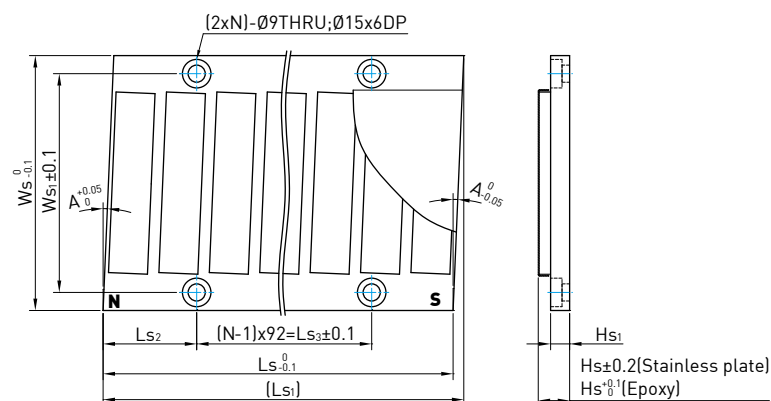
Cover for magnet (None : Stainless plate, E : Epoxy covered)



Type	Ls	Ls ₁	Ls ₂	Ls ₃	Hs	Hs ₁	Ws	Ws ₁	N	A
LMF0S1	120	124.87	31.25	60	11.8	5.9	58	48	2	4.8°
LMF0S1E	120	124.87	31.25	60	11.3	5.7	58	48	2	4.8°
LMF0S2	180	184.87	31.25	120	11.8	5.9	58	48	3	4.8°
LMF0S2E	180	184.87	31.25	120	11.3	5.7	58	48	3	4.8°
LMF0S3	300	304.87	31.25	240	11.8	5.9	58	48	5	4.8°
LMF0S3E	300	304.87	31.25	240	11.3	5.7	58	48	5	4.8°
LMF1S1	120	122.77	30.6	60	11.8	5.9	88	74	2	1.8°
LMF1S1E	120	122.77	30.6	60	11.3	5.7	88	74	2	1.8°
LMF1S2	180	182.77	30.6	120	11.8	5.9	88	74	3	1.8°
LMF1S2E	180	182.77	30.6	120	11.3	5.7	88	74	3	1.8°
LMF1S3	300	302.77	30.6	240	11.8	5.9	88	74	5	1.8°
LMF1S3E	300	302.77	30.6	240	11.3	5.7	88	74	5	1.8°
LMF2S1	120	123.09	30.4	60	13.8	7.9	118	104	2	1.5°
LMF2S1E	120	123.09	30.4	60	13.3	7.7	118	104	2	1.5°
LMF2S2	180	183.09	30.4	120	13.8	7.9	118	104	3	1.5°
LMF2S2E	180	183.09	30.4	120	13.3	7.7	118	104	3	1.5°
LMF2S3	300	303.09	30.4	240	13.8	7.9	118	104	5	1.5°
LMF2S3E	300	303.09	30.4	240	13.3	7.7	118	104	5	1.5°

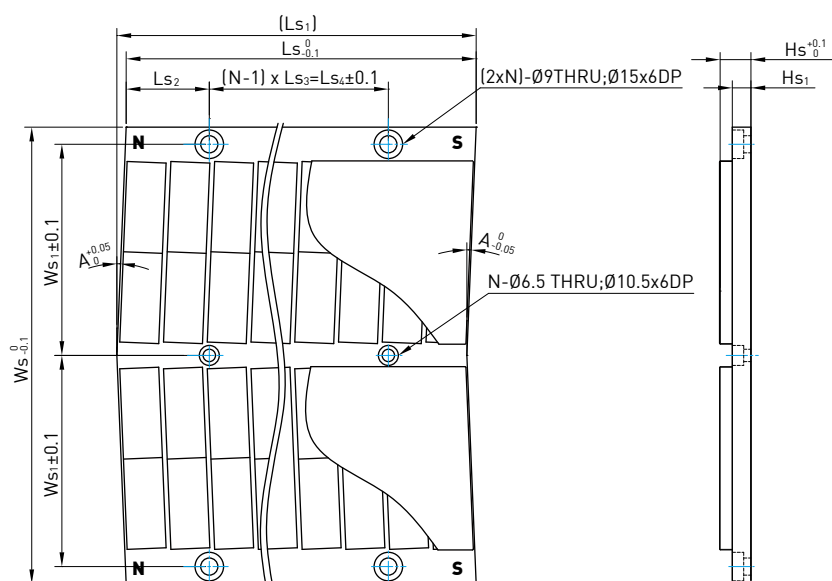
● LMFA 3 , 4 Series --Stator

Cover for magnet (None : Stainless plate, E : Epoxy covered)



TYPE	Ls	Ls1	Ls2	Ls3	Hs	Hs1	Ws	Ws1	N	A
LMF3S1	184	189.62	49.2	92	16.5	10	134	115	2	2.4°
LMF3S1E	184	189.62	49.2	92	16	9.8	134	115	2	2.4°
LMF3S2	276	281.62	49.2	184	16.5	10	134	115	3	2.4°
LMF3S2E	276	281.62	49.2	184	16	9.8	134	115	3	2.4°
LMF3S3	460	465.62	49.2	368	16.5	10	134	115	5	2.4°
LMF3S3E	460	465.62	49.2	368	16	9.8	134	115	5	2.4°
LMF4S1	184	189.03	48.9	92	18.5	12	180	161	2	1.6°
LMF4S1E	184	189.03	48.9	92	18	11.8	180	161	2	1.6°
LMF4S2	276	281.03	48.9	184	18.5	12	180	161	3	1.6°
LMF4S2E	276	281.03	48.9	184	18	11.8	180	161	3	1.6°
LMF4S3	460	465.03	48.9	368	18.5	12	180	161	5	1.6°
LMF4S3E	460	465.03	48.9	368	18	11.8	180	161	5	1.6°

● LMFA 5 , 6 Series --Stator



TYPE	Ls	Ls1	Ls2	Ls3	Ls4	Hs	Hs1	Ws	Ws1	N	A
LMF5S1E	184	188.89	43.7	92	92	16	9.8	240	111	2	2.3°
LMF5S2E	276	280.89	43.7	92	184	16	9.8	240	111	3	2.3°
LMF5S3E	460	464.89	43.7	92	368	16	9.8	240	111	5	2.3°
LMF6S1E	184	188.66	20.97	46	138	18	11.8	334	158	4	1.6°

LMFA Category	Nodes
LMFA64	20827
LMFA63	15620
LMFA62	10413
LMFA54	13850
LMFA53	10388
LMFA52	6925
LMFA44	10413
LMFA43	7810
LMFA42	5207
LMFA41	2603
LMFA34	7000
LMFA33	5250
LMFA32	3500
LMFA31	1750
LMFA24	3104
LMFA23	2328
LMFA22	1552
LMFA21	776
LMFA14	2063
LMFA13	1548
LMFA12	1032
LMFA11	516
LMFA03	845
LMFA02	564
LMFA01	149

	Symbol	Unit	LMFA01	LMFA01L	LMFA02	LMFA02L	LMFA03	LMFA03L	LMFA11	LMFA11L	LMFA12	LMFA12L	LMFA13	LMFA13L	LMFA14	LMFA14L
Continuous force	F _C	N	74	74	149	149	223	223	136	136	272	272	408	408	544	544
Continuous current	I _C	A(rms)	1.4	1.8	2.7	3.6	4.1	5.5	1.4	1.8	2.7	3.6	4.0	5.5	5.4	7.3
Continuous force (WC)	F _C (WC)	N	149	149	297	297	446	446	272	272	544	544	816	816	1089	1089
Continuous current (WC)	I _C (WC)	A (rms)	2.7	3.6	5.4	7.3	8.1	10.9	2.7	3.6	5.4	7.3	8.1	10.9	10.8	14.6
Peak force (for 1 sec.)	F _P	N	282	282	564	564	845	845	516	516	1032	1032	1548	1548	2063	2063
Peak current (for 1 sec.)	I _P	A (rms)	8.4	11.3	16.7	22.6	25.1	33.9	8.4	11.3	16.7	22.6	25.1	33.9	33.5	45.2
Force constant	K _f	N/A (rms)	55.1	40.8	55.1	40.8	55.1	40.8	100.8	74.6	100.8	74.6	100.8	74.6	100.8	74.6
Attraction force	F _A	N	457	457	914	914	1372	1372	837	837	1674	1674	2511	2511	3348	3348
Max. winding temp.	T _{max}	°C	120													
Electrical time constant	K _e	ms	7.2	7.7	7.2	7.7	7.2	7.7	7.2	7.7	7.2	7.7	7.2	7.7	7.2	7.7
Resistance (line to line at 25°C)	R ₂₅	Ω	11.7	6.0	5.9	3.0	3.9	2.0	16.9	8.7	8.4	4.3	5.6	2.9	4.2	2.2
Resistance (line to line at 120°C)	R ₁₂₀	Ω	15.4	7.9	7.7	4.0	5.1	2.6	22.3	11.5	11.1	5.7	7.4	3.8	5.6	2.9
Inductance (line to line)	L	mH	84.2	46.2	42.1	23.1	28.1	15.4	121.9	66.8	60.9	33.4	40.6	22.3	30.5	16.7
Pole pair pitch	2 τ	mm	30													
Back emf constant(line to line)	K _v	V _{rms} /(m/s)	31.8	23.5	31.8	23.5	31.8	23.5	58.2	43.1	58.2	43.1	58.2	43.1	58.2	43.1
Motor constant[at 25°C]	K _m	N/√W	13.1	13.6	18.6	19.2	22.8	23.5	20.0	20.7	28.3	29.2	34.7	35.8	40.1	41.4
Thermal resistance	R _{th}	°C/W	2.25	2.40	1.13	1.20	0.75	0.80	1.56	1.66	0.78	0.83	0.52	0.55	0.39	0.42
Thermal resistance (WC)	R _{th} (WC)	°C/W	0.56	0.60	0.28	0.30	0.19	0.20	0.39	0.42	0.20	0.21	0.13	0.14	0.10	0.10
Minimum flow rate	-	L/min	3.3	3.3	3.3	3.3	3.3	3.3	3.7	3.7	3.7	3.7	3.7	3.7	3.7	3.7
Temperature of cooling water	-	°C	20													
Thermal switch	-	-	1 x KTY84-130+ 1 x [3 PTC SNM120 In Series]													
Maximum velocity at maximum force	V _{MAX,FMAX}	m/s	5.39	7.4	5.39	7.4	5.39	7.4	3.44	4.79	3.44	4.79	3.44	4.79	3.44	4.79
Maximum electric power input	P _{EL-MAX}	W	3140	3606	6280	7212	9421	10819	4115	4667	8231	9334	12346	13997	16461	18667
Maximum dissipated heat output	Q _{P,H-MAX}	W	169	158	337	317	506	475	244	228	487	457	731	685	974	914
Stall force(WC)	F ₀	N	104	104	208	208	312	312	191	191	381	381	571	571	762	762
Stall current(WC)	I ₀	A (rms)	1.9	2.6	3.8	5.1	5.7	7.7	1.9	2.6	3.8	5.1	5.7	7.7	7.6	10.2
Max. DC bus voltage	-	V	750													
Mass of forcer	M _f	kg	1.5	1.5	2.3	2.3	3.1	3.1	2.4	2.4	4	4	5.6	5.6	7.6	7.6
Unit mass of stator	M _S	kg/m	3.7	3.7	3.7	3.7	3.7	3.7	5.8	5.8	5.8	5.8	5.8	5.8	5.8	5.8
Width of stator	W _S	mm	58	58	58	58	58	58	88	88	88	88	88	88	88	88
Length of stator/Dimension N	L _S	mm	120mm/N=2, 180mm/N=3, 300mm/N=5													
Stator mounting distance	W _{S1}	mm	48	48	48	48	48	48	74	74	74	74	74	74	74	74
Total height	H	mm	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5	48.5

[illegible][illegible]

	Symbol	Unit	LMFA52	LMFA52L	LMFA53	LMFA53L	LMFA54	LMFA54L	LMFA62	LMFA62L	LMFA63	LMFA63L	LMFA64	LMFA64L
Continuous force	F _c	N	1422	1422	2133	2133	2844	2844	1979	1979	2969	2969	3958	3958
Continuous current	I _c	A(rms)	6.2	9.1	9.3	13.7	12.4	18.3	5.8	11.5	8.7	17.3	11.5	23.1
Continuous force (WC)	F _c (WC)	N	2844	2844	4266	4266	5688	5688	3958	3958	5938	5938	7917	7917
Continuous current (WC)	I _c (WC)	A (rms)	12.4	18.3	18.6	27.4	24.7	36.5	11.5	23.1	17.3	34.6	23.1	46.2
Peak force (for 1 sec.)	F _p	N	6925	6925	10388	10388	13850	13850	10413	10413	15620	15620	20827	20827
Peak current (for 1 sec.)	I _p	A (rms)	38.4	56.6	57.5	84.9	76.7	113.2	35.8	71.6	53.7	107.4	71.3	142.6
Force constant	K _f	N/A (rms)	229.9	155.7	229.9	155.7	229.9	155.7	342.7	171.4	342.7	171.4	342.7	171.4
Attraction force	F _a	N	13700	13700	20550	20550	27400	27400	20580	20580	30870	30870	41160	41160
Max. winding temp.	T _{max}	°C	120											
Electrical time constant	K _e	ms	12.2	12.4	12.2	12.4	12.2	12.4	12.0	12.0	12.0	12.0	12.0	12.0
Resistance (line to line at 25°C)	R ₂₅	Ω	3.9	1.8	2.6	1.2	2.0	0.9	6.0	1.5	4.0	1.0	3.0	0.8
Resistance (line to line at 120°C)	R ₁₂₀	Ω	5.1	2.3	3.4	1.6	2.6	1.2	7.9	2.0	5.3	1.3	4.0	1.0
Inductance (line to line)	L	mH	47.7	21.9	31.8	14.6	23.9	10.9	72.0	18.0	48.0	12.0	36.0	9.0
Pole pair pitch	2 τ	mm	46											
Back emf constant(line to line)	K _v	V _{rms} /(m/s)	132.7	89.9	132.7	89.9	132.7	89.9	197.9	98.9	197.9	98.9	197.9	98.9
Motor constant(at 25°C)	K _m	N/√W	95.0	95.6	116.4	117.1	134.4	135.2	114.2	114.2	139.9	139.9	161.6	161.6
Thermal resistance	R _{th}	°C/W	0.32	0.33	0.21	0.22	0.16	0.16	0.24	0.24	0.16	0.16	0.12	0.12
Thermal resistance (WC)	R _{th} (WC)	°C/W	0.08	0.08	0.05	0.05	0.04	0.04	0.06	0.06	0.04	0.04	0.03	0.03
Minimum flow rate	-	L/min	6.3	6.3	6.8	6.8	7.3	7.3	6.8	6.8	7.3	7.3	7.8	7.8
Temperature of cooling water	-	°C	20											
Thermal switch	-	-	1 x KTY84-130+ 1 x {3 PTC SNM120 In Series}											
Maximum velocity at maximum force	V _{MAX,MAX}	m/s	1.92	3.04	1.92	3.04	1.92	3.04	1.12	2.61	1.12	2.61	1.12	2.61
Maximum electric power input	P _{EL,MAX}	W	24645	32267	36967	48400	49290	64534	26878	42393	40316	63590	53478	84510
Maximum dissipated heat output	Q _{P-H,MAX}	W	1181	1167	1771	1751	2362	2334	1583	1583	2375	2375	3166	3166
Stall force(WC)	F ₀	N	1991	1991	2986	2986	3982	3982	2771	2771	4156	4156	5542	5542
Stall current(WC)	I ₀	A (rms)	8.7	12.8	13.0	19.2	17.3	25.6	8.1	16.2	12.1	24.3	16.2	32.3
Max. DC bus voltage	-	V	750											
Mass of forcer	M _f	kg	23.8	23.8	32.3	32.3	40.8	40.8	32.2	32.2	44.2	44.2	56.2	56.2
Unit mass of stator	M _s	kg/m	25	25	25	25	25	25	40.1	40.1	40.1	40.1	40.1	40.1
Width of stator	W _s	mm	240	240	240	240	240	240	334	334	334	334	334	334
Length of stator/Dimension N	L _s	mm	184mm/N=2, 276mm/N=3, 460mm/N=5											
Stator mounting distance	W _{s1}	mm	222	222	222	222	222	222	316	316	316	316	316	316
Total height	H	mm	64.1	64.1	64.1	64.1	64.1	64.1	66.1	66.1	66.1	66.1	66.1	66.1

Note:Except dimensions, all the electrical specifications in the table are in ±10% of tolerance.



HIWIN MIKROSYSTEM CORP.
No.6, Jingke Central Rd.,
Taichung Precision Machinery Park,
Taichung 40852, Taiwan
Tel: +886-4-23550110
Fax: +886-4-23550123
www.hiwinmikro.tw
business@hiwinmikro.tw

Subsidiaries & R&D Centers

HIWIN GmbH
OFFENBURG, GERMANY
www.hiwin.de
www.hiwin.eu
info@hiwin.de

HIWIN JAPAN
KOBE · TOKYO · NAGOYA · NAGANO ·
TOHOKU · HOKURIKU · HIROSHIMA ·
KUMAMOTO · FUKUOKA, JAPAN
www.hiwin.co.jp
info@hiwin.co.jp

HIWIN USA
CHICAGO · SILICON VALLEY, U.S.A.
www.hiwin.com
info@hiwin.com

HIWIN s.r.o.
BRNO, CZECH REPUBLIC
www.hiwin.cz
info@hiwin.cz

HIWIN Schweiz GmbH
JONA, SWITZERLAND
www.hiwin.ch
info@hiwin.ch

HIWIN FRANCE
ECHAUFFOUR, FRANCE
www.hiwin.fr
info@hiwin.fr

HIWIN Srl
BRUGHERIO, ITALY
www.hiwin.it
info@hiwin.it

HIWIN SINGAPORE
SINGAPORE
www.hiwin.sg
info@hiwin.sg

HIWIN KOREA
SOWON, KOREA
www.hiwin.kr
info@hiwin.kr

HIWIN CHINA
SUZHOU, CHINA
www.hiwin.cn
info@hiwin.cn

Mega-Fabs Motion System, Ltd.
HAIFA, ISRAEL
www.mega-fabs.com
info@mega-fabs.com

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