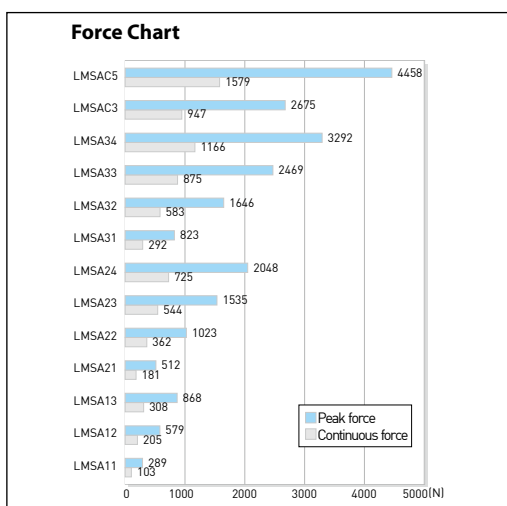


Extremely Low Profile Linear Motors, **LMSA** Series



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

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

Structure of the order number of linear motors LMSA, stator

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

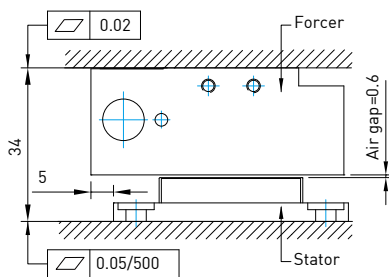
- 1: 120 mm
- 2: 180 mm
- 3: 300 mm

Cover for magnet

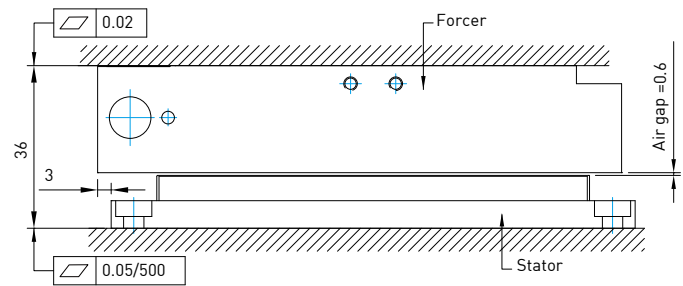
- EA: Epoxy covered
- None: Stainless plate

Mounting tolerance

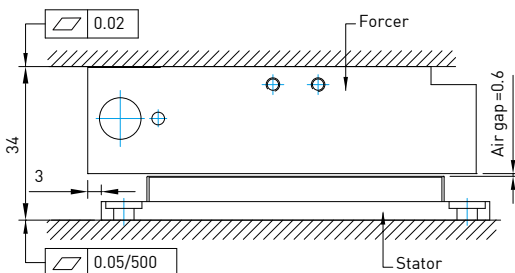
LMSA1 □



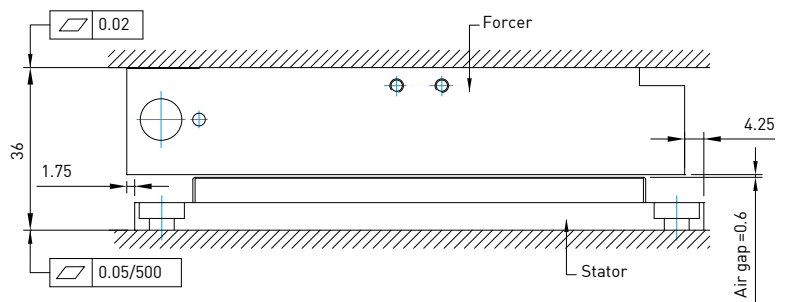
LMSA3 □



LMSA2 □



LMSAC □



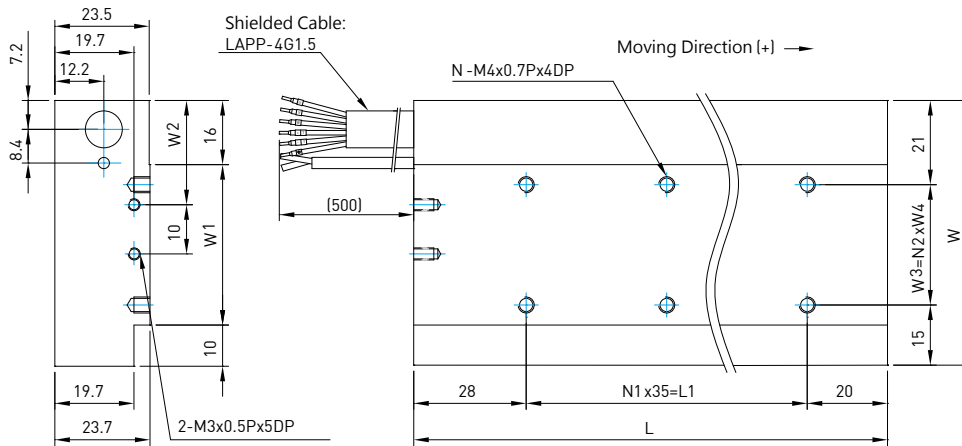
Specifications

	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

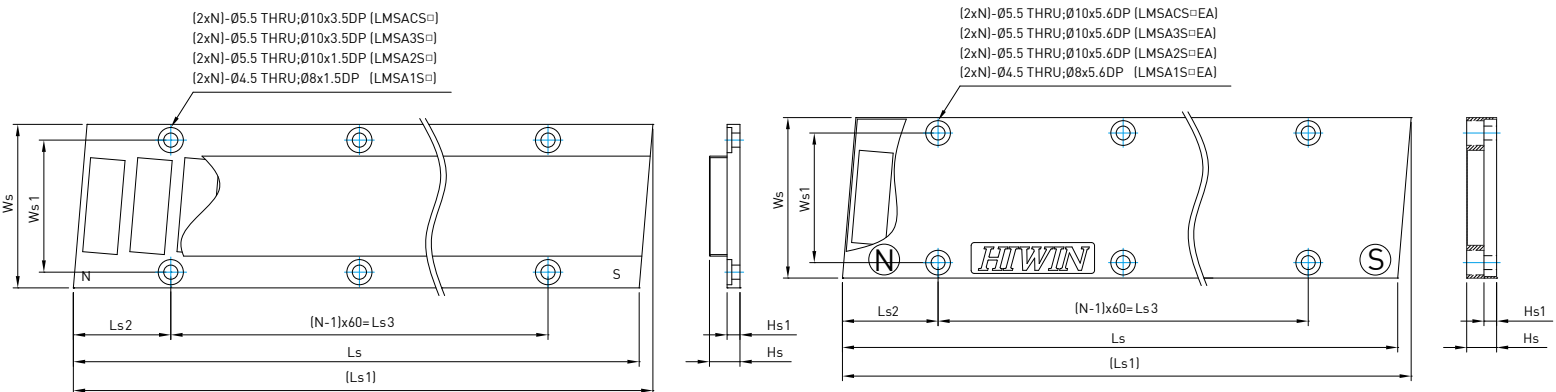
Note : Values in the table refer to operation without forced cooling.
 Except dimensions, all the electrical specifications in the table are in ±10% of tolerance.
 We keep the right to revise above content without prior notice.
 Specification is based on the final drawing confirmed by the customer.

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

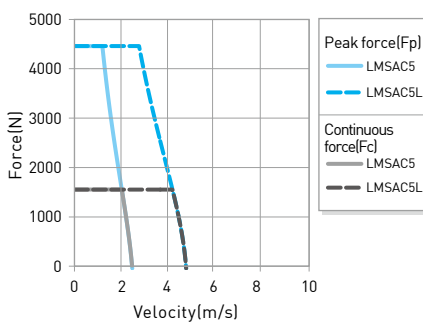
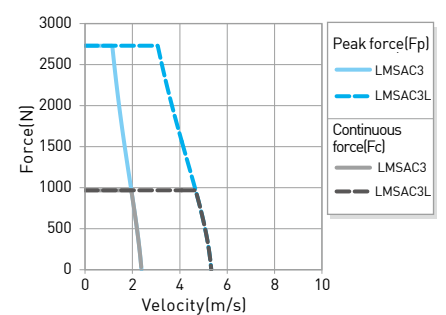
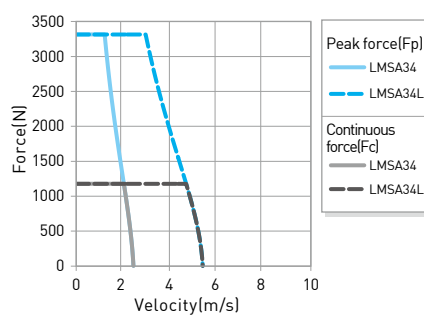
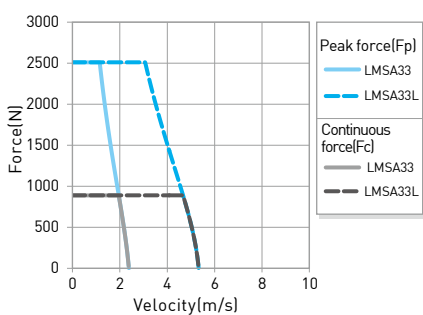
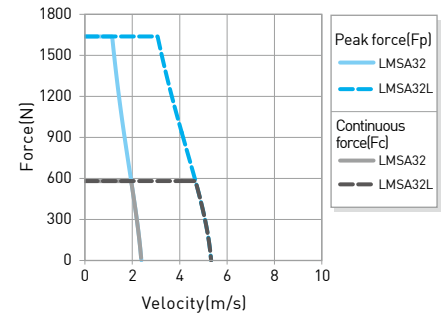
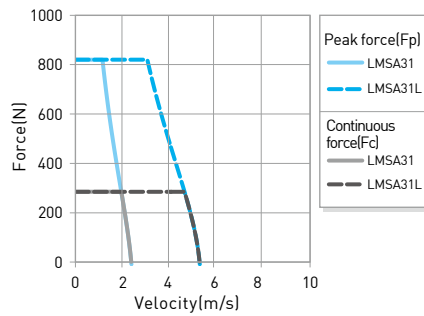
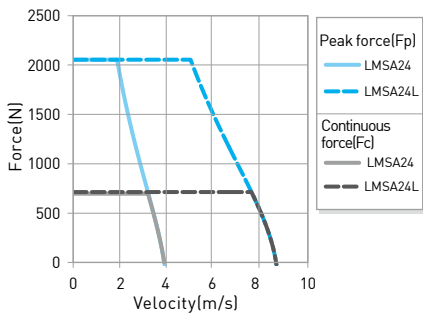
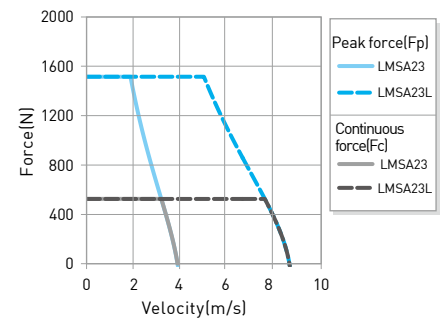
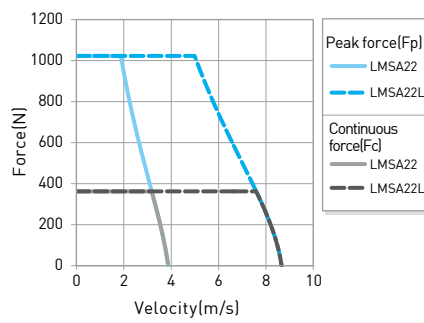
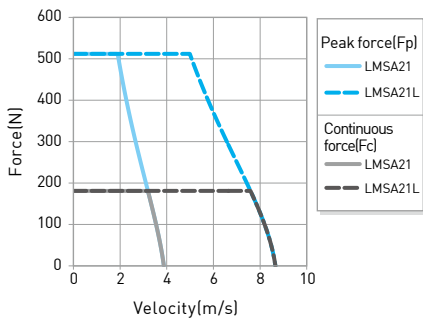
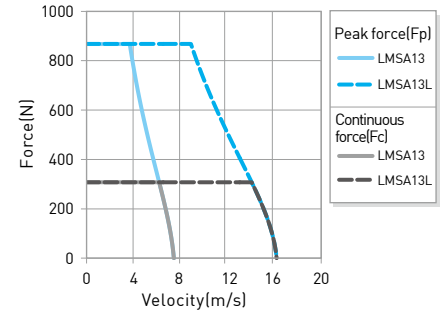
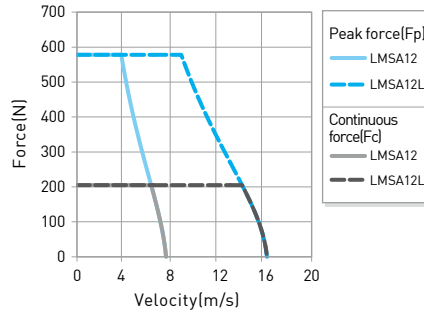
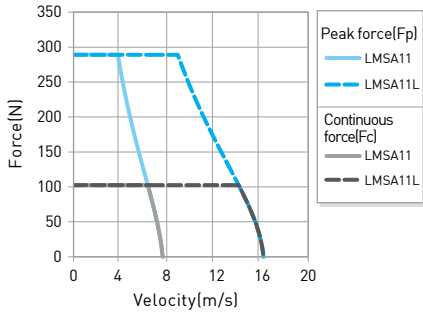
Dimensions of Stator



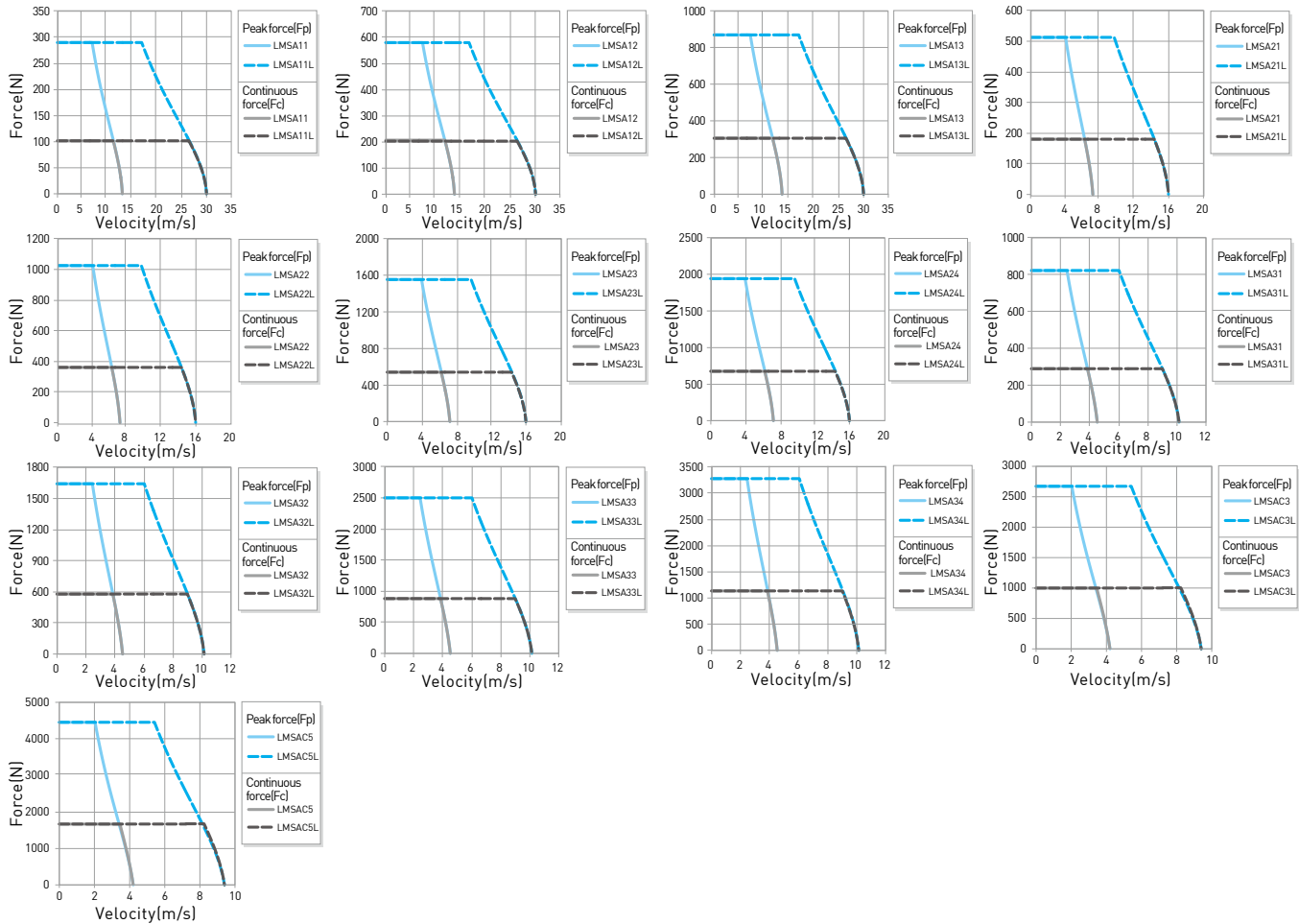
Type	Ls	Ls1	Ls2	Ls3	Ws	Ws1	Hs	Hs1	N
LMSA1S1(EA)	120	124.36	31	60	52	42	9.7	4.1	2
LMSA1S2(EA)	180	184.36	31	120	52	42	9.7	4.1	3
LMSA1S3(EA)	300	304.36	31	240	52	42	9.7	4.1	5
LMSA2S1(EA)	120	122.7	30.57	60	86	74	9.7	4.1	2
LMSA2S2(EA)	180	182.7	30.57	120	86	74	9.7	4.1	3
LMSA2S3(EA)	300	302.7	30.57	240	86	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.



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