HIWIN®
Motion Control and System Technology

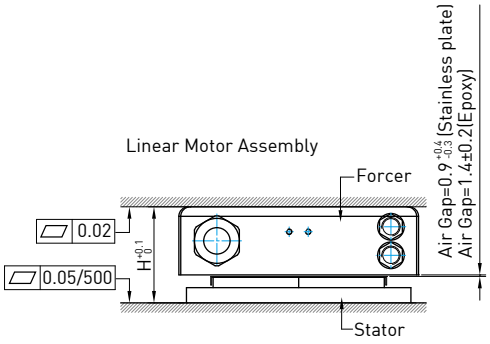
Linear Motor

LMFA Series

HIWIN LMFA series are permanent-magnet synchronuous 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



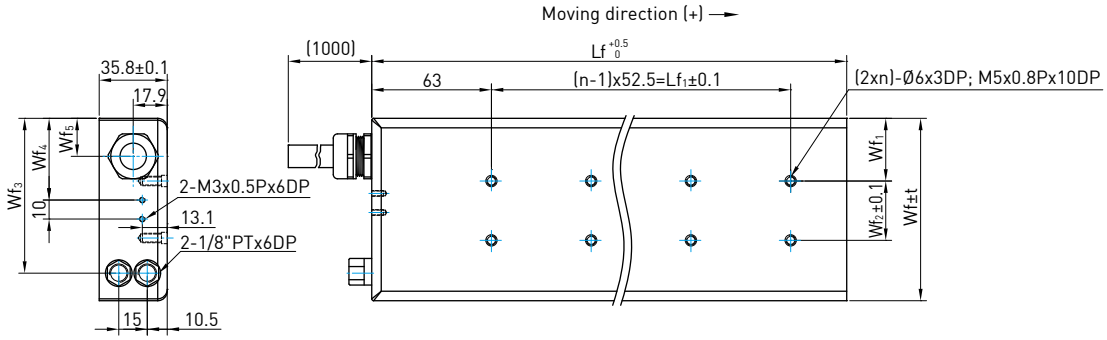
TYPE	H	TYPE	H	TYPE	H
LMFA01	48.5	LMFA31	64.1	LMFA52	64.1
LMFA02	48.5	LMFA32	64.1	LMFA53	64.1
LMFA03	48.5	LMFA33	64.1	LMFA54	64.1
LMFA11	48.5	LMFA34	64.1	LMFA62	66.1
LMFA12	48.5	LMFA41	66.1	LMFA63	66.1
LMFA13	48.5	LMFA42	66.1	LMFA64	66.1
LMFA14	48.5	LMFA43	66.1		
LMFA21	50.5	LMFA44	66.1		
LMFA22	50.5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

Structure of the order number of linear motors LMFA, forcer

LM FA 3 1 L

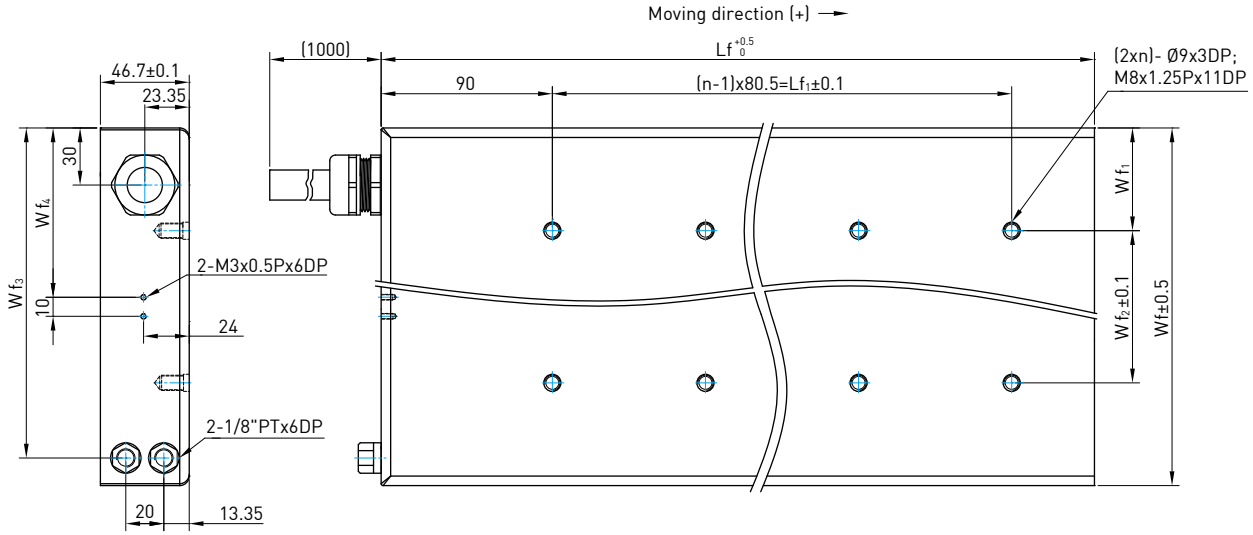
Series	Type	Width of forcer	Length of forcer		Wiring code
LM: linear motor	FA: linear motor type	0: 67mm 1: 96mm 2: 126mm 3: 141 mm 4: 188 mm 5: 248 mm 6: 342 mm	LMFA0~2 series 1:145mm 2:250mm 3:355mm 4:460mm	LMFA3~6 series 1:214mm 2:375mm 3:536mm 4:697mm	None:Standard L:Low back emf

• LMFA 0 , 1 , 2 Series --Forcer



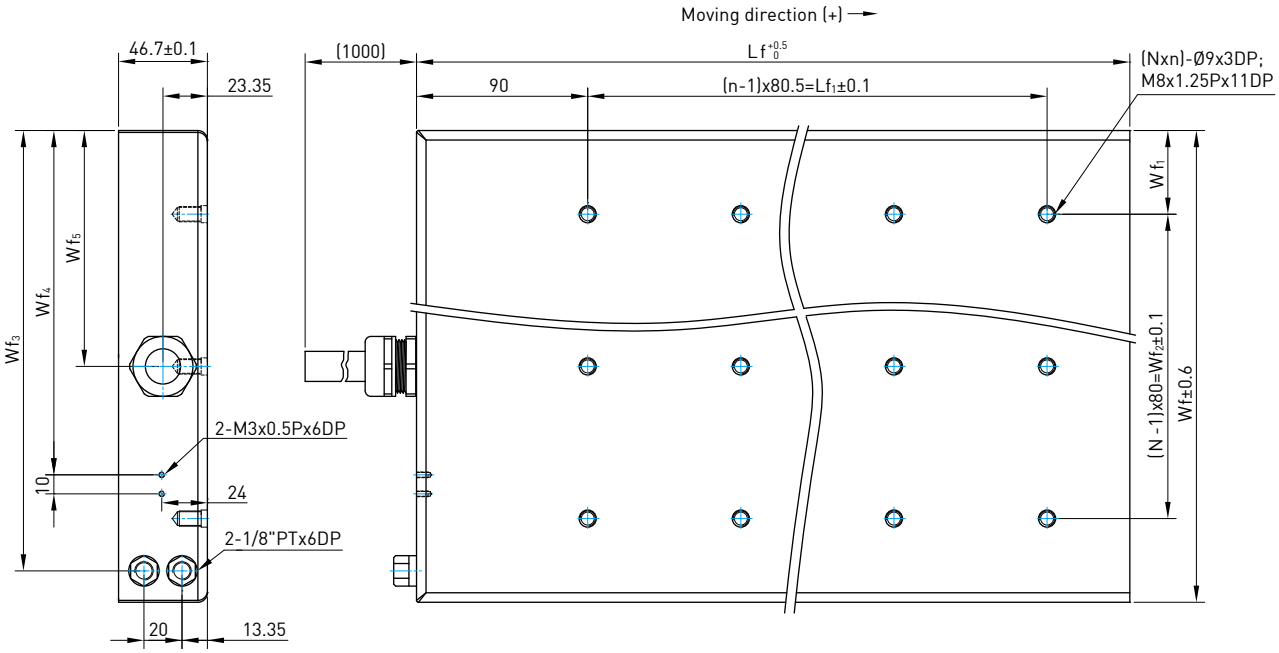
TYPE	Lf	Lf_1	Wf	Wf_1	Wf_2	Wf_3	Wf_4	Wf_5	n	t
LMFA01	145	52.5	67	18.5	30	55	33.75	14.4	2	0.3
LMFA02	250	157.5	67	18.5	30	55	33.75	14.4	4	0.3
LMFA03	355	262.5	67	18.5	30	55	33.75	14.4	6	0.3
LMFA11	145	52.5	96	33	30	81.5	43	20	2	0.4
LMFA12	250	157.5	96	33	30	81.5	43	20	4	0.4
LMFA13	355	262.5	96	33	30	81.5	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	Lf1	Wf	Wf1	Wf2	Wf3	Wf4	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	Lf1	Wf	Wf1	Wf2	Wf3	Wf4	Wf5	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

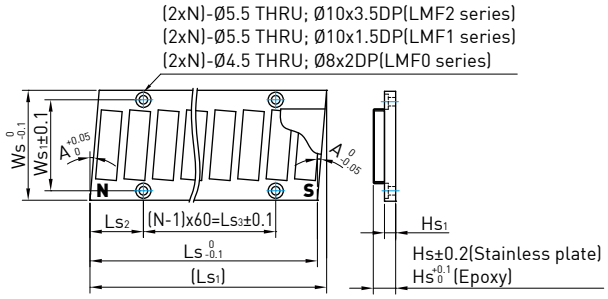
LMF 3 S 1 E

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 colloated with LMF stator.

● LMFA 0 , 1 , 2 Series --Stator

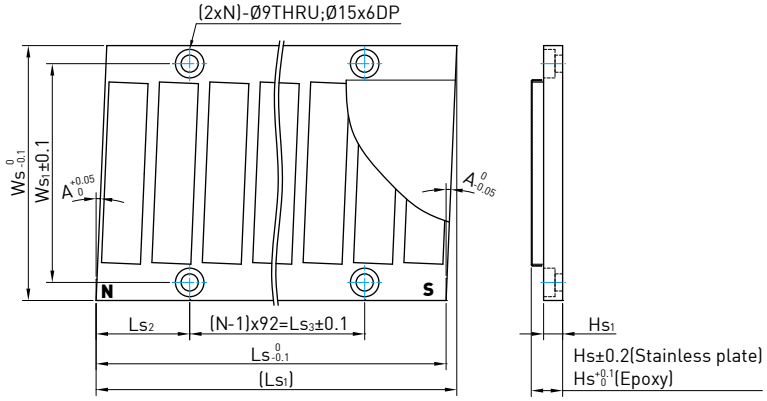
Cover for magnet (None : Stainless plate, E : Epoxy covered)



Type	Ls	Ls1	Ls2	Ls3	Hs	Hs1	Ws	Ws1	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°

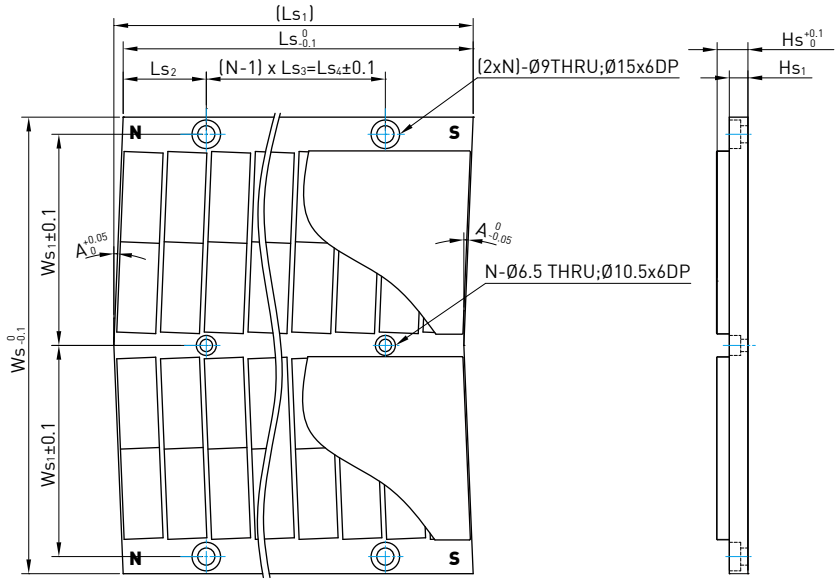
LMFA 3 , 4 Series --Stator

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°

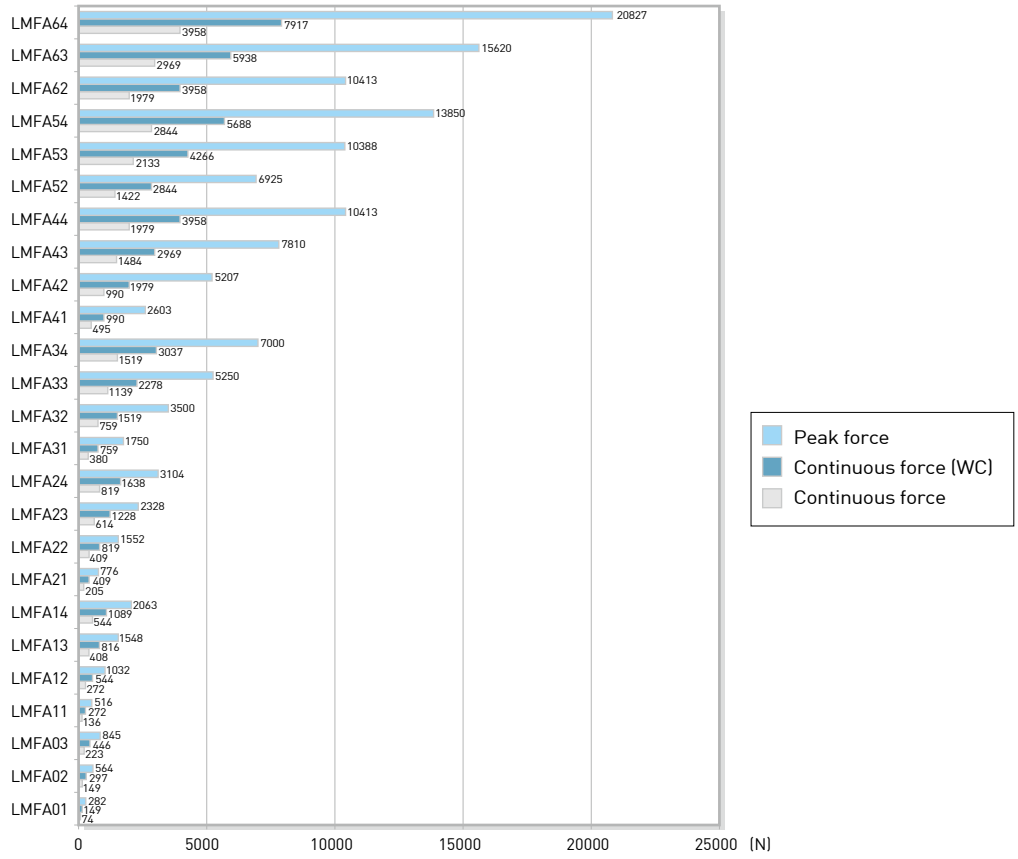
LMFA 5 , 6 Series --Stator



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°

Specifications for Linear Motors, LMFA Series

Force Chart for Linear Motors, LMFA Series



	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}	℃	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℃)	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℃)	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	2τ	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℃)	K_m	N/$\sqrt{W}$	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}	℃/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)	℃/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	-	℃	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

	Symbol	Unit	LMFA21	LMFA21L	LMFA22	LMFA22L	LMFA23	LMFA23L	LMFA24	LMFA24L	LMFA31	LMFA31L	LMFA32	LMFA32L
Continuous force	F_c	N	205	205	409	409	614	614	819	819	380	380	759	759
Continuous current	I_c	A(rms)	1.4	1.8	2.7	3.6	4.1	5.5	5.4	7.3	3.1	4.6	6.2	9.1
Continuous force (WC)	F_c (WC)	N	409	409	819	819	1228	1228	1638	1638	759	759	1519	1519
Continuous current (WC)	I_c (WC)	A (rms)	2.7	3.6	5.4	7.3	8.1	10.9	10.8	14.6	6.2	9.1	12.4	18.3
Peak force (for 1 sec.)	F_p	N	776	776	1552	1552	2328	2328	3104	3104	1750	1750	3500	3500
Peak current (for 1 sec.)	I_p	A (rms)	8.4	11.3	16.7	22.6	25.1	33.9	33.5	45.2	19.2	28.3	38.4	56.6
Force constant	K_f	N/A (rms)	151.6	112.2	151.6	112.2	151.6	112.2	151.6	112.2	122.7	83.1	122.7	83.1
Attraction force	F_a	N	1259	1259	2518	2518	3777	3777	5036	5036	3430	3430	6860	6860
Max. winding temp.	T_{max}	℃	120											
Electrical time constant	K_e	ms	7.2	7.7	7.2	7.7	7.2	7.7	7.2	7.7	11.3	11.4	11.3	11.4
Resistance (line to line at 25℃)	R_{25}	Ω	24.8	12.7	12.4	6.4	8.3	4.2	6.2	3.2	4.3	1.9	2.1	1.0
Resistance (line to line at 120℃)	R_{120}	Ω	32.7	16.8	16.4	8.4	10.9	5.6	8.2	4.2	5.6	2.6	2.8	1.3
Inductance (line to line)	L	mH	178.6	97.8	89.3	48.9	59.5	32.6	44.6	24.5	48.3	22.2	24.2	11.1
Pole pair pitch	2τ	mm	30	30	30	30	30	30	30	30	46	46	46	46
Back emf constant(line to line)	K_v	V_{rms}/(m/s)	87.5	64.8	87.5	64.8	87.5	64.8	87.5	64.8	70.9	48.0	70.9	48.0
Motor constant(at 25℃)	K_m	$N/\sqrt{W}$	24.9	25.7	35.2	36.3	43.1	44.5	49.7	51.3	48.4	48.7	68.5	68.9
Thermal resistance	R_{th}	℃/W	1.06	1.13	0.53	0.57	0.35	0.38	0.27	0.28	1.17	1.19	0.59	0.59
Thermal resistance (WC)	R_{th} (WC)	℃/W	0.27	0.28	0.13	0.14	0.09	0.09	0.07	0.07	0.29	0.30	0.15	0.15
Minimum flow rate	-	L/min	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	4.0	5.2	5.2
Temperature of cooling water	-	℃	20											
Thermal switch	-	-	1 x KTY84-130+ 1 x (3 PTC SNM120 In Series)											
Maximum velocity at maximum force	$v_{MAX,FMAX}$	m/s	2.21	3.14	2.21	3.14	2.21	3.14	2.21	3.14	4.08	6.19	4.08	6.19
Maximum electric power input	$P_{EL,MAX}$	W	5152	5661	10304	11321	15455	16982	20607	22643	10255	13910	20509	27821
Maximum dissipated heat output	$Q_{P,H,MAX}$	W	358	336	715	671	1073	1007	1431	1342	324	320	648	641
Stall force(WC)	F_0	N	287	287	573	573	860	860	1146	1146	531	531	1063	1063
Stall current(WC)	I_0	A (rms)	1.9	2.6	3.8	5.1	5.7	7.7	7.6	10.2	4.3	6.4	8.7	12.8
Max. DC bus voltage	-	V	750											
Mass of forcer	M_f	kg	3.2	3.2	5.5	5.5	8	8	10.4	10.4	6.4	6.4	11.7	11.7
Unit mass of stator	M_s	kg/m	9.8	9.8	9.8	9.8	9.8	9.8	9.8	9.8	16.2	16.2	16.2	16.2
Width of stator	W_s	mm	118	118	118	118	118	118	118	118	134	134	134	134
Length of stator/Dimension N	L_s	mm	120mm/N=2, 180mm/N=3, 300mm/N=5								184mm/N=2, 276mm/N=3, 460mm/N=5			
Stator mounting distance	W_{s1}	mm	104	104	104	104	104	104	104	104	115	115	115	115
Total height	H	mm	50.5	50.5	50.5	50.5	50.5	50.5	50.5	50.5	64.1	64.1	64.1	64.1

	Symbol	Unit	LMFA33	LMFA33L	LMFA34	LMFA34L	LMFA41	LMFA41L	LMFA42	LMFA42L	LMFA43	LMFA43L	LMFA44	LMFA44L
Continuous force	F_c	N	1139	1139	1519	1519	495	495	990	990	1484	1484	1979	1979
Continuous current	I_c	A(rms)	9.3	13.7	12.4	18.3	2.9	4.3	5.8	8.5	8.7	12.8	11.5	17.0
Continuous force (WC)	F_c (WC)	N	2278	2278	3037	3037	990	990	1979	1979	2969	2969	3958	3958
Continuous current (WC)	I_c (WC)	A (rms)	18.6	27.4	24.7	36.5	5.8	8.5	11.5	17.0	17.3	25.6	23.1	34.1
Peak force (for 1 sec.)	F_p	N	5250	5250	7000	7000	2603	2603	5207	5207	7810	7810	10413	10413
Peak current (for 1 sec.)	I_p	A (rms)	57.5	84.9	76.7	113.3	17.9	26.4	35.8	52.9	53.5	79.3	71.6	105.7
Force constant	K_f	N/A (rms)	122.7	83.1	122.7	83.1	171.4	116.1	171.4	116.1	171.4	116.1	171.4	116.1
Attraction force	F_a	N	10290	10290	13720	13720	5145	5145	10290	10290	15435	15435	20580	20580
Max. winding temp.	T_{max}	℃	120											
Electrical time constant	K_e	ms	11.3	11.4	11.3	11.4	12.0	12.1	12.0	12.1	12.0	12.1	12.0	12.1
Resistance (line to line at 25℃)	R_{25}	Ω	1.4	0.6	1.1	0.5	6.0	2.7	3.0	1.4	2.0	0.9	1.5	0.7
Resistance (line to line at 120℃)	R_{120}	Ω	1.9	0.9	1.4	0.6	7.9	3.6	4.0	1.8	2.6	1.2	2.0	0.9
Inductance (line to line)	L	mH	16.1	7.4	12.1	5.5	72.0	33.0	36.0	16.5	24.0	11.0	18.0	8.3
Pole pair pitch	2τ	mm	46											
Back emf constant(line to line)	K_v	V_{rms}/(m/s)	70.9	48.0	70.9	48.0	98.9	67.0	98.9	67.0	98.9	67.0	98.9	67.0
Motor constant(at 25℃)	K_m	$N/\sqrt{W}$	83.9	84.4	96.9	97.4	57.1	57.5	80.8	81.3	98.9	99.5	114.2	114.9
Thermal resistance	R_{th}	℃/W	0.39	0.40	0.29	0.30	0.96	0.97	0.48	0.49	0.32	0.32	0.24	0.24
Thermal resistance (WC)	R_{th} (WC)	℃/W	0.10	0.10	0.07	0.07	0.24	0.24	0.12	0.12	0.08	0.08	0.06	0.06
Minimum flow rate	-	L/min	5.7	5.7	6.2	6.2	5.2	5.2	5.2	5.2	5.7	5.7	6.2	6.2
Temperature of cooling water	-	℃	20											
Thermal switch	-	-	1 x KTY84-130+ 1 x (3 PTC SNM120 In Series)											
Maximum velocity at maximum force	$v_{MAX,FMAX}$	m/s	4.08	6.19	4.08	6.19	2.61	4.01	2.61	4.01	2.61	4.01	2.61	4.01
Maximum electric power input	$P_{EL,MAX}$	W	30764	41731	41019	55642	10598	14198	21197	28396	31691	42594	42393	56792
Maximum dissipated heat output	$Q_{P,H,MAX}$	W	972	961	1296	1281	396	391	792	782	1187	1173	1583	1565
Stall force(WC)	F_0	N	1594	1594	2126	2126	693	693	1385	1385	2078	2078	2771	2771
Stall current(WC)	I_0	A (rms)	13.0	19.2	17.3	25.6	4.0	6.0	8.1	11.9	12.1	17.9	16.2	23.9
Max. DC bus voltage	-	V	750											
Mass of forcer	M_f	kg	17.3	17.3	22.5	22.5	9.5	9.5	16.2	16.2	23	23	29	29
Unit mass of stator	M_s	kg/m	16.2	16.2	16.2	16.2	22.3	22.3	22.3	22.3	22.3	22.3	22.3	22.3
Width of stator	W_s	mm	134	134	134	134	180	180	180	180	180	180	180	180
Length of stator/Dimension N	L_s	mm	184mm/N=2, 276mm/N=3, 460mm/N=5											
Stator mounting distance	W_{s1}	mm	115	115	115	115	161	161	161	161	161	161	161	161
Total height	H	mm	64.1	64.1	64.1	64.1	66.1	66.1	66.1	66.1	66.1	66.1	66.1	66.1

	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}	℃	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℃)	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℃)	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	2τ	mm	46											
Back emf constant(line to line)	K_v	Vrms/(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℃)	K_m	N/$\sqrt{W}$	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}	℃/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)	℃/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	-	℃	20											
Thermal switch	-	-	1 x KTY84-130+ 1 x (3 PTC SNM120 In Series)											
Maximum velocity at maximum force	$v_{MAX,FMAX}$	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.

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