

**FEM Motor**

***Three-Phase Squirrel Cage  
Induction Motors  
Complying to IE2 & IE3  
EU Efficiency  
Certification***



**EMPOWER DRIVES & AUTOMATION SDN BHD**



The new series of **Frander Elektrim Motor**, now written in short form **FEM**, is robust in design and construction to meet the ever increasing demand in quality for all standard industries drives. The output range from 1.1 KW to 90 KW is now manufactured to the high efficiency greeting meeting the requirement of the EUROPE standard of the efficiency level. The word IE1, IE2 or IE3 appearing on the name plate shall designated to its performance.

**COMPLIANCES**

- IEC Part 1 & BS 5000 part 10
- IEC part 9, BS 4999 part 51
- BS 4999 part 50
- DIN IEC 34 part 7
- DIN IEC 34 part 4/5

**SPECIAL FEATURES**

- Terminal box are all of cast iron to meet the efficiency requirement.
- Enlarge terminal box from 160 frame is an improve protection to IP55/IP56 designated.
- High grade laminated sheet-steel is used to minimizes electrical harming sound are improve efficiency.
- High grade bearing are used in the motor to lower down sound lever & prolong running life.
- Varnish are vacuum impregnated.

**SPECIFICATION**

- Design Voltage : 400V/3ø/50Hz
- Utility Voltage : 380V-420V - 3ø-50Hz  
440V-480- 3ø-60Hz

**CONNECTION**

- 0.18 KW to 1.5 KW
- Dual Voltage : 230V – Delta  
400V – Star
- Up to 3 KW : Star connection at  
400V/3ø/50Hz
- From 4 KW onward : Delta connection at  
400V/3ø/50Hz

		<b>FEM Motor</b>		EFF 2	CE
Type: MK		IP	Ins.Cl	F	S1
V.	Hz	KW	RPM	Amp	Eff
380-420	50				
440-480	60				

**BEARING SIZE**

FRAME	Poles	Drive End	Non-Drive End
63	2 , 4	6201ZZ	6201ZZ
71	2, 4, 6	6202ZZ	6202ZZ
80	2, 4, 6, 8	6204ZZ	6204ZZ
90	2, 4, 6, 8	6205ZZ	6205ZZ
100	2, 4, 6, 8	6206ZZ	6206ZZ
112	2, 4, 6, 8	6206ZZ	6206ZZ
132	2, 4, 6, 8	6208ZZ	6208ZZ
160	2, 4, 6, 8	6309C3	6309C3
180	2, 4, 6, 8	6311C3	6311C3
200	2, 4, 6, 8	6312C3	6312C3
225	2, 4, 6, 8	6313C3	6313C3
250	2, 4, 6, 8	6314C3	6314C3
280	2	6314C3	6314C3
	4, 6, 8	6317C3/NU317C3	6317C3
315	2	6317C3	6317C3
	4, 6, 8, 10	6319C3/NU319C3	6319C3
355	2	6319C3	6319C3
	4, 6, 8, 10	6322C3/NU322C3	6322C3



# PERFORMANCE DATA

## 2 POLES MOTOR (IE2)

**Construction** : Cast Iron  
**Type** : Cage Rotor  
**Enclosure** : IP55  
**Rating** : Continuous  
**Insulation Class** : F  
**Supply Voltage** : 3 Phase 50Hz up to 660V

MODEL SIZE			SPEED r/min	FLC AT 380V A	FLC AT 415V A	EFFICIENCY (%)			POWER FACTOR, Cos Ø			DOL Starting % Of Full Load		NOISE LEVEL dB (A)	WEIGHT Kg
FRAME SIZE	KW	HP				100%	75%	50%	100%	75%	50%	LRT	LRC		
MK 80A	0.75	1	2875	1.77	1.6	77.4	77.0	73.0	0.83	0.79	0.66	230	680	64	18
MK 80B	1.1	1.5	2875	2.5	2.3	79.6	78.0	73.0	0.84	0.78	0.67	230	730	64	20
MK 90S	1.5	2	2890	3.32	3.0	81.3	78.0	74.0	0.84	0.8	0.72	230	760	69	20
MK 90L	2.2	3	2890	4.72	4.3	83.2	8.0	80.0	0.85	0.81	0.72	230	780	69	23
MK 100L	3	4	2891	6.17	5.6	84.6	83.0	81.0	0.87	0.83	0.76	230	810	76	32
MK 112M	4	5.5	2914	8.04	7.3	85.8	86.0	83.0	0.88	0.88	0.76	230	830	79	37
MK 132S	5.5	7.5	2937	11.2	10.2	87.0	87.0	86.0	0.86	0.83	0.72	230	820	81	57
MK 132M	7.5	10	2940	14.6	13.3	88.1	87.0	86.0	0.88	0.84	0.72	230	780	81	60
MK 160MA	11	15	2930	21	19.1	89.4	87.0	84.5	0.89	0.84	0.76	230	790	83	106
MK 160MB	15	20	2930	28.4	25.8	90.3	87.0	85.0	0.89	0.85	0.82	230	800	83	114
MK 160L	18.5	25	2937	34.7	31.6	90.9	89.0	88.0	0.89	0.86	0.84	230	810	83	131
MK 180M	22	30	2940	41.6	37.9	91.3	91.0	90.0	0.88	0.88	0.82	230	820	85	168
MK 200LA	30	40	2950	54.2	49.3	92.0	91.0	91.0	0.88	0.87	0.8	220	750	86	219
MK 200LB	37	50	2950	68.2	62.1	92.5	91.5	91.0	0.89	0.83	0.75	220	750	86	236
MK 225M	45	60	2960	82.5	75.1	92.9	93.0	92.5	0.89	0.89	0.83	220	760	88	288
MK 250M	55	75	2965	99.5	90.5	93.2	94.5	94.0	0.9	0.86	0.79	220	760	91	382
MK 280S	75	100	2970	135	122.9	93.8	94.5	93.0	0.9	0.87	0.81	200	690	93	494
MK 280M	90	125	2970	160	145.6	94.1	93.0	92.0	0.91	0.88	0.85	200	700	93	550
MK 315S	110	150	2975	194	176.5	94.3	93.5	93.0	0.91	0.88	0.85	200	710	94	890
MK 315M	132	175	2975	233	212.0	94.6	94.0	93.5	0.91	0.89	0.83	200	710	94	995
MK 315LA	160	220	2975	278	253.0	94.8	94.5	93.0	0.92	0.91	0.89	200	710	94	1046
MK 315LB	200	270	2975	348	316.7	95.0	93.5	93.0	0.92	0.91	0.89	200	710	94	1145
MK 355MA	250	350	2980	434	394.9	95.0	95.0	94.0	0.92	0.91	0.89	200	710	102	1714
MK 355L	315	420	2980	547	497.8	95.0	95.0	94.5	0.92	0.91	0.89	200	710	95	1870

## 2 POLES MOTOR (IE3)

**Construction** : Cast Iron  
**Type** : Cage Rotor  
**Enclosure** : IP55  
**Rating** : Continuous  
**Insulation Class** : F  
**Supply Voltage** : 3 Phase 50Hz up to 660V

MODEL SIZE			SPEED r/min	FLC AT 380V A	FLC AT 415V A	EFFICIENCY (%)			POWER FACTOR, Cos Ø			DOL Starting % Of Full Load		NOISE LEVEL dB (A)	WEIGHT Kg
FRAME SIZE	KW	HP				100%	75%	50%	100%	75%	50%	LRT	LRC		
MK 80B	1.1	1.5	2880	2.43	2.2	82.7	82.2	81.9	0.83	0.78	0.69	230	730	69	19
MK 90S	1.5	2	2895	3.25	3.0	84.2	83.8	83.6	0.83	0.8	0.72	230	760	69	24
MK 90L	2.2	3	2895	4.72	4.3	85.9	85.2	85.0	0.85	0.81	0.72	230	750	72	27
MK 100L	3	4	2895	5.94	5.4	87.1	86.6	86.2	0.88	0.83	0.76	230	810	76	36
MK 112M	4	5.5	2905	7.83	7.1	88.1	87.9	87.6	0.88	0.86	0.76	230	830	79	43
MK 132S	5.5	7.5	2930	10.6	9.6	89.2	89.0	88.8	0.88	0.83	0.72	230	800	81	65
MK 132M	7.5	10	2900	13.7	12.5	90.1	89.9	87.0	0.88	0.84	0.72	230	790	81	70
MK 160MA	11	15	2945	20.4	18.6	91.2	90.7	90.2	0.9	0.84	0.76	230	790	83	116
MK 160MB	15	20	2930	26.5	24.1	91.9	91.2	90.8	0.89	0.85	0.82	230	810	83	126
MK 160L	18.5	25	2940	34.1	31.0	92.4	92.0	91.7	0.89	0.86	0.84	230	810	85	145
MK 180M	22	30	2950	41.6	37.9	92.7	92.2	92.0	0.89	0.88	0.82	230	750	86	189
MK 200LA	30	40	2960	54.8	49.9	93.3	93.0	92.7	0.89	0.87	0.8	230	750	86	219
MK 200LB	37	50	2970	64	58.2	93.7	93.2	92.9	0.89	0.87	0.8	230	760	86	236
MK 225M	45	60	2965	82.5	75.1	94.0	93.7	93.3	0.88	0.87	0.83	230	760	88	288
MK 250M	55	75	2970	99.6	90.6	94.3	93.7	93.4	0.89	0.86	0.79	230	760	91	382
MK 280S	75	100	2975	134	121.9	94.7	94.0	93.7	0.9	0.87	0.81	230	690	93	494
MK 280M	90	125	2975	162	147.4	95.0	94.7	94.4	0.89	0.88	0.85	230	700	93	550
MK 315S	110	150	2978	195	177.5	95.2	93.5	93.0	0.9	0.88	0.85	220	710	94	890
MK 315M	132	175	2978	233	212.0	95.4	94.0	93.5	0.9	0.89	0.83	220	710	94	995
MK 315LA	160	220	2980	283	257.5	95.6	94.5	93.0	0.9	0.91	0.89	220	710	94	1046
MK 315LB	200	270	2980	349	317.6	95.8	93.5	93.0	0.91	0.91	0.89	220	710	94	1145
MK 355MA	250	350	2982	431	392.2	95.8	95.0	94.0	0.92	0.91	0.89	220	710	102	1714
MK 355L	315	420	2982	543	494.1	95.8	95.0	94.5	0.92	0.91	0.89	220	710	102	1870





# PERFORMANCE DATA

## 6 POLES MOTOR (IE2)

**Construction** : Cast Iron  
**Type** : Cage Rotor  
**Enclosure** : IP55  
**Rating** : Continuous  
**Insulation Class** : F  
**Supply Voltage** : 3 Phase 50Hz up to 660V

MODEL SIZE			SPEED r/min	FLC AT 380V A	FLC AT 415V A	EFFICIENCY (%)			POWER FACTOR, Cos Ø			DOL Starting % Of Full Load		NOISE LEVEL dB (A)	WEIGHT Kg
FRAME SIZE	KW	HP				100%	75%	50%	100%	75%	50%	LRT	LRC		
MK 90S	0.75	1	910	2	1.82	75.9	68.0	60.0	0.71	0.62	0.48	200	580	64	20
MK 90L	1.1	1.5	910	28	25.48	78.1	71.0	70.0	0.72	0.67	0.53	200	590	64	20
MK 100L	1.5	2	920	3.7	3.367	79.8	75.0	74.0	0.72	0.67	0.54	200	590	68	31
MK 112M	2.2	3	935	5.4	4.914	81.8	78.0	77.0	0.72	0.67	0.54	200	620	72	37
MK 132S	3	4	960	7.1	6.461	83.3	79.0	80.0	0.72	0.70	0.55	210	640	76	54
MK 132MA	4	5.5	960	9.2	8.372	84.6	81.0	80.0	0.74	0.70	0.56	210	660	76	64
MK 132MB	5.5	7.5	960	12.3	11.193	86	83.0	81.0	0.75	0.71	0.65	210	680	76	73
MK 160M	7.5	10	970	15.9	14.469	87.2	85.0	84.0	0.78	0.75	0.68	200	680	80	104
MK 160L	11	15	970	22.7	20.657	88.7	86.0	85.5	0.79	0.75	0.68	200	690	80	126
MK 180L	15	20	970	29.8	27.118	89.7	88.0	87.0	0.81	0.82	0.70	200	730	79	169
MK 200LA	18.5	25	980	36.5	33.215	90.4	89.0	88.0	0.8	0.76	0.67	210	720	79	211
MK 200LB	22	30	980	43.1	39.221	90.9	89.0	88.0	0.81	0.78	0.70	210	730	79	225
MK 225M	30	40	985	57.6	52.416	91.7	91.0	90.5	0.82	0.79	0.71	200	680	80	281
MK 250M	37	50	980	69.8	63.518	92.2	91.0	90.0	0.83	0.81	0.72	210	700	82	378
MK 280S	45	60	980	82	74.62	92.7	92.0	90.0	0.85	0.81	0.73	210	720	83	475
MK 280M	55	75	980	100	91	93.1	92.0	91.0	0.86	0.82	0.76	210	720	83	541
MK 315S	75	100	985	136	123.76	93.7	93	92	0.84	0.82	0.75	200	650	88	795
MK 315M	90	125	985	163	148.33	94	93	92	0.85	0.83	0.77	200	660	88	965
MK 315LA	110	150	985	198	180.18	94.3	94	93	0.85	0.83	0.77	200	660	88	1052
MK 315LB	132	175	985	234	212.94	94.6	94	92.5	0.86	0.82	0.74	200	670	88	1130
MK 355MA	160	220	990	283	257.53	94.8	94	92	0.86	0.85	0.79	200	670	89	1593
MK 355MB	200	270	990	353	321.23	95	94	93.5	0.86	0.85	0.79	200	680	89	1700
MK 355L	250	350	990	442	402.22	95	94.5	93.5	0.86	0.87	0.83	200	680	89	1890

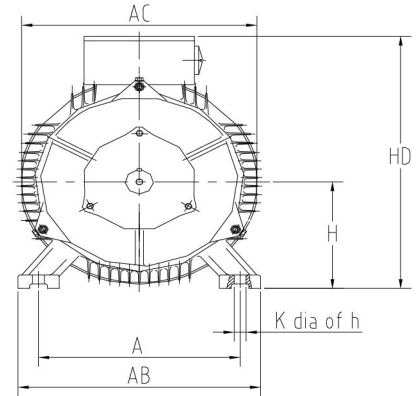
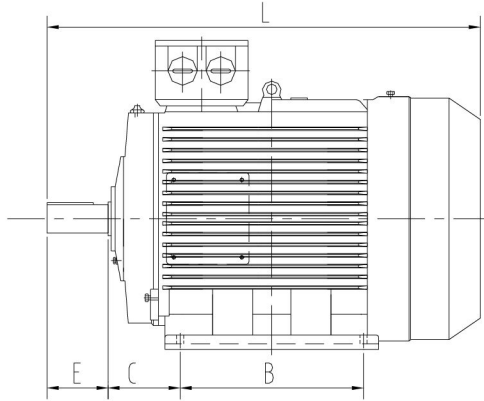
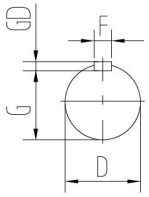
## 6 POLES MOTOR (IE3)

**Construction** : Cast Iron  
**Type** : Cage Rotor  
**Enclosure** : IP55  
**Rating** : Continuous  
**Insulation Class** : F  
**Supply Voltage** : 3 Phase 50Hz up to 660V

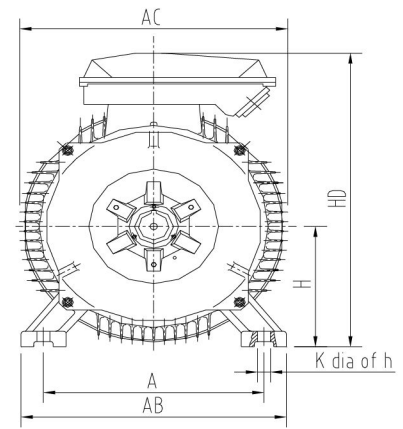
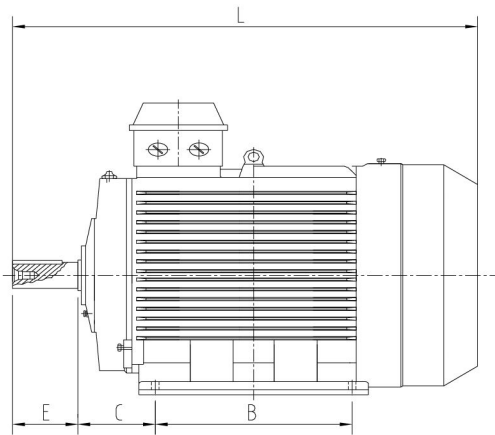
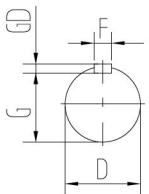
MODEL SIZE			SPEED r/min	FLC AT 380V A	FLC AT 415V A	EFFICIENCY (%)			POWER FACTOR, Cos Ø			DOL Starting % Of Full Load		NOISE LEVEL dB (A)	WEIGHT Kg
FRAME SIZE	KW	HP				100%	75%	50%	100%	75%	50%	LRT	LRC		
MK 90S	0.75	1	935	2.36	2.1476	78.9	78.7	78.5	0.61	0.60	0.50	210	580	64	20
MK 90L	1.1	1.5	945	2.99	2.7209	81	81.0	79.5	0.69	0.67	0.60	210	580	64	20
MK 100L	1.5	2	949	4	3.64	82.5	82.5	81.5	0.69	0.67	0.60	210	600	68	31
MK 112M	2.2	3	955	5.58	5.0778	84.3	84.3	83.3	0.71	0.68	0.63	210	600	72	37
MK 132S	3	4	968	7.48	6.8068	85.6	85.6	84.6	0.71	0.70	0.65	210	620	76	54
MK 132MA	4	5.5	968	9.85	8.9635	86.8	86.8	85.8	0.71	0.70	0.65	210	680	76	64
MK 132MB	5.5	7.5	968	12.6	11.466	88	88.0	87.0	0.75	0.71	0.68	210	710	76	73
MK 160M	7.5	10	970	16.6	15.106	89.1	89.1	89.0	0.77	0.75	0.70	210	810	80	104
MK 160L	11	15	970	23.4	21.294	90.3	90.3	90.0	0.79	0.75	0.70	210	890	80	126
MK 180L	15	20	978	30.8	28.028	91.2	91.2	90.6	0.81	0.79	0.72	200	720	79	169
MK 200LA	18.5	25	980	37.8	34.398	91.7	91.7	91.0	0.81	0.76	0.72	210	720	79	211
MK 200LB	22	30	980	43.6	39.676	92.2	92.0	91.5	0.83	0.78	0.73	210	730	79	225
MK 225M	30	40	980	58.3	53.053	92.9	92.9	92.2	0.84	0.79	0.73	210	710	80	281
MK 250M	37	50	985	71.7	65.247	93.3	93.3	93.0	0.84	0.81	0.74	210	710	82	378
MK 280S	45	60	985	85.6	77.896	93.7	93.5	93.2	0.85	0.82	0.75	210	720	83	475
MK 280M	55	75	985	104	94.64	94.1	93.8	93.3	0.85	0.82	0.76	210	720	83	541
MK 315S	75	100	985	142	129.22	94.6	94.6	94.1	0.85	0.82	0.75	200	670	88	795
MK 315M	90	125	985	169	153.79	94.9	94.8	94.7	0.85	0.83	0.77	200	670	88	965
MK 315LA	110	150	990	204	185.64	95.1	95.1	95	0.86	0.83	0.77	200	670	88	1052
MK 315LB	132	175	990	244	222.04	95.4	95.3	94.5	0.86	0.83	0.77	200	670	88	1130
MK 355MA	160	220	990	296	269.36	95.6	95.6	95.4	0.86	0.85	0.79	200	670	89	1593
MK 355MB	200	270	990	360	327.6	95.8	95.8	95.6	0.88	0.85	0.79	200	670	89	1700
MK 355L	250	350	990	360	327.6	95.8	95.8	95.6	0.88	0.87	0.83	200	670	89	1890



# DIMENSIONS



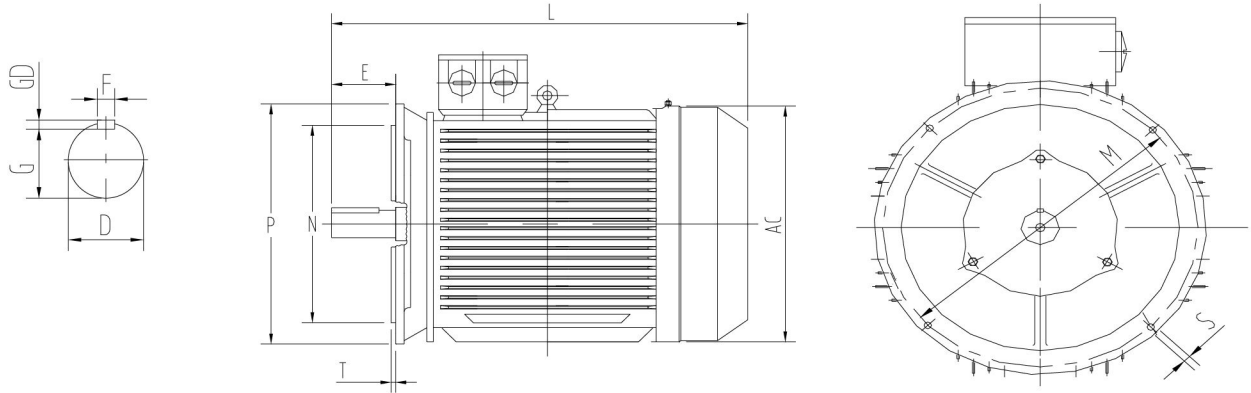
FRAME SIZE	DIMENSIONS IN MILLIMETERS (mm)												
	H	A	B	C	D 2P   4,6,8P	E 2P   4,6,8P	F X GD 2P   4,6,8P	G 2P   4,6,8P	K	AB	AC	HD	L 2P   4,6,8P
MK 63	63	100	80	40	11	23	4 x 4	8.5	7	135	130	80	225
MK 71	71	112	90	45	14	30	5 x 5	11	7	145	145	200	255
MK 80	80	125	100	50	19	40	6 x 6	15.5	10	160	165	225	285
MK 90S	90	140	100	56	24	50	8 x 7	20	10	175	180	240	310
MK 90L	90	140	125	56	24	50	8 x 7	20	10	175	180	240	335
MK 100L	100	160	140	63	28	60	8 x 7	24	12	200	205	275	380
MK 112M	112	190	140	70	28	60	8 x 7	24	12	235	225	290	395
MK 132S	132	216	140	89	38	80	10 x 8	33	12	270	265	335	465
MK 132M	132	216	178	89	38	80	10 x 8	33	15	270	265	335	505



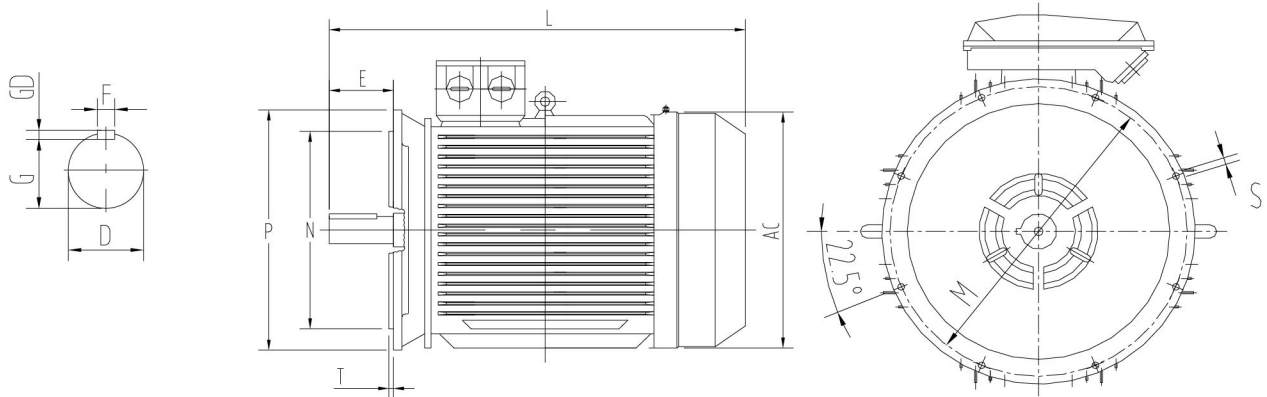
FRAME SIZE	DIMENSIONS IN MILLIMETERS (mm)												
	H	A	B	C	D 2P   4,6,8P	E 2P   4,6,8P	F X GD 2P   4,6,8P	G 2P   4,6,8P	K	AB	AC	HD	L 2P   4,6,8P
MK 160M	160	254	210	108	42	110	12 x 8	37	15	325	330	415	600
MK 160L	160	254	254	108	42	110	12 x 8	37	15	325	330	415	645
MK 180M	180	279	241	121	48	110	14 x 9	42.5	15	350	355	450	670
MK 180L	180	279	279	121	48	110	14 x 9	42.5	15	355	355	450	710
Mk 200L	200	318	305	133	55	110	16 x 10	49	19	390	395	510	770
MK 225S	225	356	286	149	60	140	18 x 11	53	19	435	440	560	820
MK 225M	225	356	311	149	55   60	110   140	16x10   18x11	49   53	19	435	450	560	815   840
MK 250M	250	406	349	168	60   65	140	18 x 11	53   58	24	490	515	645	930
MK 280S	280	457	368	190	65   75	140	18x11   20x12	58   67.5	24	555	585	715	975
MK 280M	280	457	419	190	65   75	140	18x11   20x12	58   67.5	24	555	585	715	1040
MK 315S	315	508	406	216	65   80	140   170	18x11   22x14	58   71	28	640	630	870	1190   1220
MK 315M	315	508	457	216	65   80	140   170	18x11   22x14	58   71	28	640	630	870	1300   1330
MK 315L	315	508	508	216	65   80	140   170	18x11   22x14	58   71	28	640	630	870	1300   1330
MK 355M	355	610	560	250	70   100	140   210	20x12   28x16	62.5   90	35	730	710	1010	1495   1565
MK 355L	355	610	630	250	70   100	140   210	20x12   28x16	62.5   90	35	730	710	1010	1495   1565



# DIMENSIONS



FRAME SIZE	DIMENSIONS IN MILLIMETERS (mm)										
	T	M	N	P	D	E	F X GD	G	S	AC	L
					2P   4,6,8P	2P   4,6,8P	2P   4,6,8P	2P   4,6,8P			2P   4,6,8P
MKF 63	3	115	95	140	11	23	4 x 4	8.5	10	130	225
MKF 71	3.5	130	110	160	14	30	5 x 5	11	10	145	250
MKF 80	3.5	165	130	200	19	40	6 x 6	15.5	12	175	295
MKF 90S	3.5	165	130	200	24	50	8 x 7	20	12	195	315
MKF 90L	3.5	165	130	200	24	50	8 x 7	20	12	195	340
MKF 100L	4	215	180	250	28	60	8 x 7	24	15	215	385
MKF 112M	4	215	180	250	28	60	8 x 7	24	15	240	400
MKF 132S	4	265	230	300	38	80	10 x 8	33	15	275	470
MKF 132M	4	265	230	300	38	80	10 x 8	33	15	275	510



FRAME SIZE	DIMENSIONS IN MILLIMETERS (mm)										
	T	M	N	P	D	E	F X GD	G	S	AC	L
					2P   4,6,8P	2P   4,6,8P	2P   4,6,8P	2P   4,6,8P			2P   4,6,8P
MKF 160M	5	300	250	350	42	110	12 x 8	37	19	330	615
MKF 160L	5	300	250	350	42	110	12 x 8	37	19	330	670
MKF 180M	5	300	250	350	48	110	14 x 9	42.5	19	380	700
MKF 180L	5	300	250	350	48	110	14 x 9	42.5	19	380	740
MKF 200L	5	350	300	400	55	110	16 x 10	49	19	420	770
MKF 225S	5	400	350	450	60	140	18 x 11	53	19	470	820   845
MKF 225M	5	400	350	450	55   60	110   140	16x10   18x11	49   53	19	470	815
MKF 250M	5	500	450	550	60   65	140	18 x 11	53   58	19	510	910
MKF 280S	5	500	450	550	65   75	140	18x11   20x12	58   67.5	19	580	985
MKF 280M	5	500	450	550	65   75	140	18x11   20x12	58   67.5	19	580	1035
MKF 315S	5	600	550	660	65   80	140   170	18x11   22x14	58   71	24	645	1160   1270
MKF 315M	5	600	550	660	65   80	140   170	18x11   22x14	58   71	24	645	1190   1300
MKF 315L	5	600	550	660	65   80	140   170	18x11   22x14	58   71	24	645	1190   1300
MKF 355M	5	740	680	800	75   95	140   170	20x15   25x18	67.5   86	24	710	1500   1530
MKF 355L	5	740	680	800	75   95	140   170	20x15   25x18	67.5   86	24	710	1500   1530



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