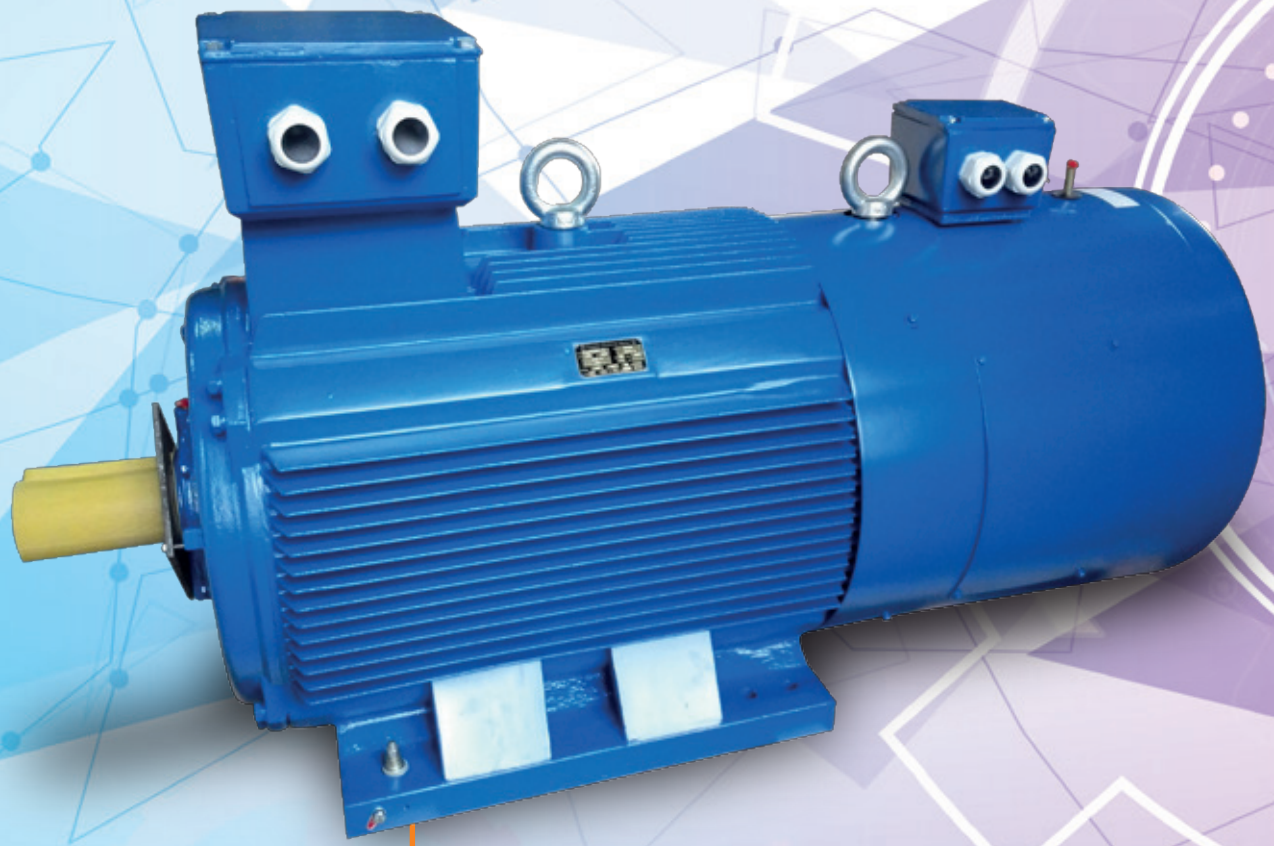
FRANDER ELEKTRIM

SLIP-RING MOTORS



SLIP-RING FOR CONTINUOUS DUTY

EMPOWER DRIVES & AUTOMATION SDN BHD

INTRODUCTION

The three phase slip ring asynchronous motor is designed to achieve higher starting torque with lower starting current. This is particularly achievable in area where there is limited power supply or when electrical generator is in used instead of main power. It is commonly used in conjunction of starting for various equipments such as stone crusher in the quarrying industries, ID fan for boiler, compressor, pre-breaker machine for the rubber industries, bucket elevator and others rotating machines that require high starting torque with limiting starting current due to circumstances and environmental constrains.

GENERAL SPECIFICATION

The design and construction of the motor strictly comply to IEC standard and is according to DIN 42679. Its mounting dimension is therefore identical to any motor of the same frame size.

MAIN STRUCTURE

The motor is made of ribbed iron casting, the parallel and vertical distribution cooling fins are installed for heat dissipation and beautifying the appearance. Terminal boxes are located on top of the motor frame for easy connection with cable coming in either side of the motor. Separated terminal box are provided for stator and rotor for motor frame size 315, 355 and above. Double lifting hooks are provided for smooth hoisting in the process of transportation and installation. Motors of frame 180 and above shall be equipped by fill control system for convenient in refueling the bearing without resting the motor so as to protect bearing and reduce running noise.

STATOR AND ROTOR WINDING

Motor is design to S1 continuous duty at 415V/3ph/50Hz operation. The copper wires selected are of the high quality round and rectangular type enameled with class 'F' grading. Varnish is vacuum impregnated to ensure all the winding is well covered. It is design that the temperature rise of the motor will limit to 80°C.

THE SLIP RING ASSEMBLY

The slip ring and brushes are equipped inside non drive end extension and it is well covered to avoid direct expose to weather. An inspection window is installed at the cover for easy inspection of the slip ring and brushes condition. Therefore the brushes can be regulated without dismantling component when the machine is at rest. For better and easier maintenance, the skips are made of stainless steel and insulations are phenolic plastic for excellent mechanical strength and insulation. The brushes are made of metal graphite with better electrical conductivity and abrasion resistance for longer service life. The dust shield is equipped in between the slip ring and the winding to prevent contamination from the milled carbon dust.

CARBON BRUSH DETAILS

Frame Size	Dimension
132 - 200	25 x 10 x 40
225 - 250	32 x 12.5 x 40
280	40 x 12.5 x 42
315 - 355	40 x 20 x 64
400	50 x 20 x 60

DERATING FACTOR BASED ON AMBIENT TEMPERATURE & ALTITUDE

Ambient Temperature, °C	40	45	50	55	60	65	70	75
Derating Factor on Rated Power, kW	1.00	0.96	0.92	0.87	0.82	0.77	0.72	0.67

Altitude above Sea Level, m	1000	2000	3000	4000
Derating Factor on Rated Power, kW	1	0.94	0.88	0.82

BEARING DETAILS

Frame Size	Drive End	Non-Drive End
132	6308	6308
160	6309	6309
180	6311	6311
200	6312	6312
225	6313	6313
250	6314	6314
280	NU317	6317
315	NU319	6319
355	NU322	6322
400	NU324	6324

BEARING REGREASING DETAILS

Frame Size	Bearing on Drive end					Bearing on Non-Drive end				
	Type	Grease Amount, g	Regreasing Interval, Hrs			Type	Grease Amount, g	Regreasing Interval, Hrs		
			4 poles	6 Poles	8 Poles			4 Poles	6 Poles	8 Poles
200	6312	35	8000	8000	8000	6312	35	8000	8000	8000
225	6313	40	8000	8000	8000	6313	40	8000	8000	8000
250	NU314	35	3200	8000	8000	6314	45	8000	8000	8000
280	NU317	50	2500	8000	8000	6317	70	8000	8000	8000
315	NU319	65	2000	3000	3000	6319	85	4000	6000	6000
355	NU322	90	2000	3000	3000	6322	110	4000	6000	6000
400	NU324	105	2000	3000	3000	6324	135	4000	6000	6000

OIL SEAL DETAILS – DRIVE END AND NON DRIVE END

Frame Size	Oil Seal Size
200	F60 X 80 X 8
225	F65 X 85 X 10
250	F70 X 90 X 10
280	F85 X 120 X 12
315	F95 X 130 X 12
355	F110 X 140 X 12D
400	F120 X 150 X 12D

CENTER HOLES SIZE FOR SLIP RING MOTOR

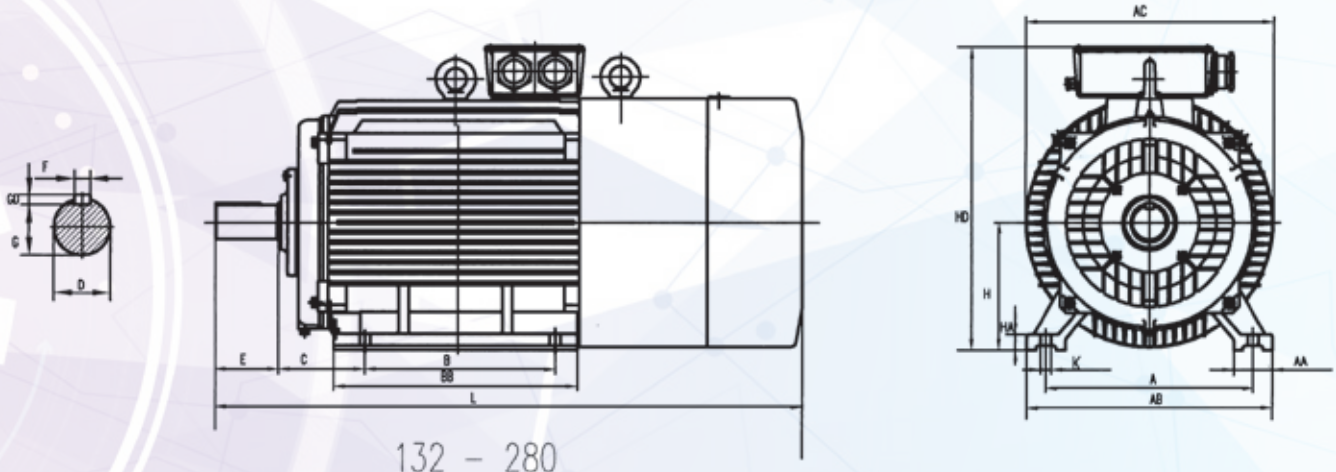
Frame Size	Poles	Shaft Size, mm	Center hole
225	4,6,8	60Ø x 140	N/A
250	4,6,8	65Ø x 140	N/A
280	4,6,8	75Ø x 140	M20 x 42
315	4,6,8	80Ø x 170	M20 x 42
355	4,6,8	100Ø x 210	M20 x 42
400	4,6,8	110Ø x 210	M20 x 42

TECHNICAL DATA OF SLIP RING MOTORS FOR CONTINUOUS DUTY S1

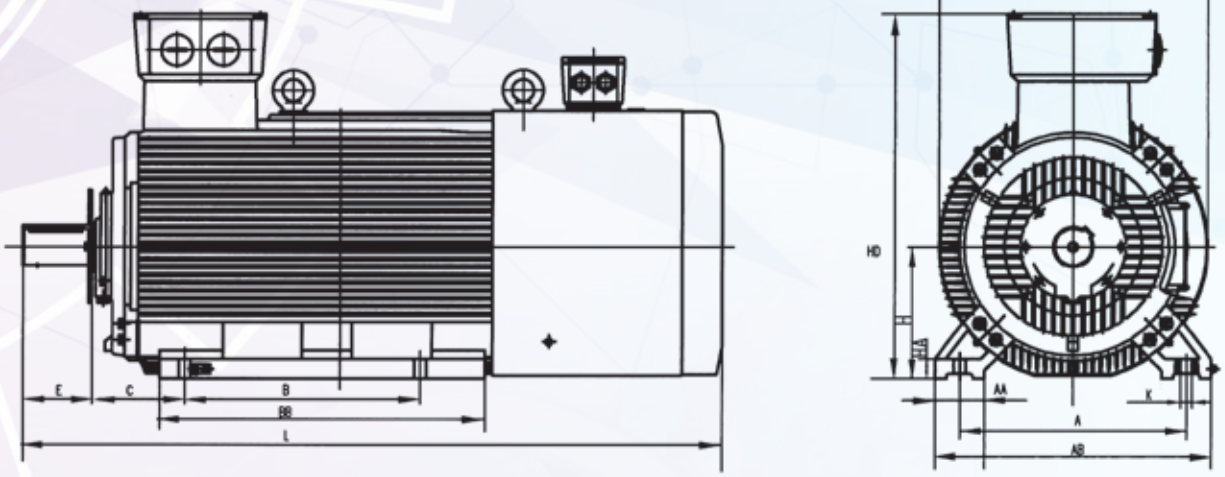
MOTOR TYPE	POWER OUTPUT		SPEED	STATOR CURRENT (AMPS)	EFFI-CIENCY	POWER FACTOR	TORQUE	TM	ROTOR		INERTIA	NOISE LEVEL	WEIGHT
Sug	kW	HP	rpm	415V	%		Nm		Volt	Amps	kgm²	dB	kg
4 Poles													
200L1-4	18.5	25	1470	33.6	89	0.86	120.2	3	247	47.5	0.29	94	272
200L2-4	22	30	1470	39.6	90	0.86	142.9	3	293	47	0.32	94	286
225M2-4	30	40	1475	52.7	91	0.87	194.2	3	360	51.5	0.63	98	376
250M1-4	37	50	1480	65.4	92	0.86	138.8	3	289	79	0.87	98	460
250M2-4	45	60	1480	78.6	92.5	0.87	190.4	3	340	81	0.98	100	520
280S-4	55	75	1480	95.2	92.5	0.88	354.9	3	485	70	1.86	100	655
280M-4	75	100	1485	128.3	92.5	0.88	482.3	3	344	132.6	2.41	103	765
315S-4	90	125	1484	153	93	0.88	579.2	3	320	170	3.97	103	1175
315M-4	110	150	1486	186.9	93.5	0.88	706.9	3	331	195	4.59	103	1263
315L1-4	132	175	1487	224	94	0.89	847.7	4.4	413	191	5.33	106	1338
315L2-4	160	220	1488	266	94	0.88	1026.9	3	483	198	6.11	106	150
355M1-4	200	270	1483	334	94	0.91	1287.9	3	505	239	10.03	106	1952
355M2-4	250	350	1486	412	94.5	0.91	1606.7	3	598	251	11.33	108	2078
355L-4	280	375	1488	471	94.5	0.91	1797	3	730	229	12.47	108	2194
6 Poles													
200L1-6	15	20	980	28.3	88.5	0.814	146.2	2.8	198	48	0.41	88	277
225M1-6	18.5	25	980	34	88.5	0.83	180.3	2.8	188	63	0.65	88	335
225M2-6	22	30	980	41.2	89.5	0.83	214.4	2.8	224	61	0.72	88	360
250M1-6	30	40	980	55.3	90.5	0.84	292.3	2.8	282	66	1.22	91	480
250M2-6	37	50	980	67.7	91	0.84	360.6	2.8	331	69	1.35	91	520
280S-6	45	60	985	81.9	91.5	0.86	436.3	2.8	351	79	2.41	94	645
280M-6	55	75	985	97.9	92	0.86	533.2	2.8	423	80	2.74	94	695
315S-6	75	100	989	129	93	0.85	724.2	2.8	460	99	5.48	98	1220
315M-6	90	125	990	154	93.2	0.85	868.2	2.8	474	115	6.25	98	1335
315L1-6	110	150	990	186	93.5	0.86	1061.1	2.8	477	139	7.3	98	1421
315L2-6	132	175	990	223	94	0.85	1273.3	2.8	461	172	8.45	98	1430
355M1-6	160	220	990	274	94	0.87	1543.4	2.8	447	217	12.28	102	1950
355M2-6	200	270	990	338	94	0.87	1929.3	2.8	565	212	14.86	102	2164
355L-6	220	300	992	370	94.5	0.87	2117.9	2.8	633	209	16.71	102	2273
8 Poles													
200L-8	11	15	730	23	86	0.73	143.9	2.4	147	47	0.41	82	276
225M1-8	15	20	735	31	88	0.75	194.9	2.4	169	56	0.71	86	357
225M1-8	18.5	25	735	38	89	0.75	240.4	2.4	211	54	0.83	86	387
250M1-8	22	30	735	44	89	0.76	285.9	2.4	214	65	1.18	86	480
250M2-8	30	40	735	60	89.5	0.77	389.8	2.4	274	68	1.4	90	520
280S-8	37	50	740	71	91	0.79	477.5	2.4	281	82	2.36	90	645
280M-8	45	60	740	83	92	0.8	580.7	2.4	358	78	3	93	735
315S-8	55	75	741	99	92	0.79	708.8	2.4	479	70	5.24	93	1060
315M-8	75	100	742	132	92.5	0.79	965.3	2.4	480	95	6.82	96	1386
315L1-8	90	125	743	160	93	0.81	1156.8	2.4	500	109	7.82	96	1475
315L2-8	110	150	743	209.4	93	0.81	1413.9	2.4	506	131	9.21	96	1485
355M1-8	132	175	741	241	93	0.82	1701.2	2.4	452	176	13.24	99	1908
355M2-8	160	220	741	289	93.5	0.82	2062.1	2.4	542	177	16.05	99	2086
355L-8	185	250	743	334	93.6	0.82	2377.9	2.4	626	177	17.84	99	2203

MOUNTING DIMENSIONS – IMB3

Frame Size	A	B	C	D	E	FxGD	G	H	K	AB	AC	AA	BB	HD	HA	L
200L	318	305	133	55	110	16x10	49	200	19	388	400	70	375	525	25	970
225M	56	311	149	60	140	18x11	53	225	19	435	446	75	400	555	28	1061
250M	406	349	168	65	140	18x11	58	250	24	490	495	80	450	615	30	1150
280S	457	368	190	75	140	20x12	67.5	280	24	550	560	85	490	700	35	1260
280M	457	419	190	75	140	20x12	67.5	280	24	550	560	85	540	700	35	1310
315S	508	406	216	80	170	22x14	71	315	28	635	635	125	680	870	45	1700
315M	508	457	216	80	170	22x14	71	315	28	635	635	125	680	870	45	1700
315L	508	508	216	80	170	22x14	71	315	28	635	635	125	680	870	45	1700
355M	610	560	254	100	210	28x16	90	355	28	730	730	125	750	1010	52	1910
355L	610	630	254	100	210	28x16	90	355	28	730	730	125	750	1010	52	1910
400L	686	710	280	110	210	28x16	100	400	35	840	820	150	985	1105	60	2115



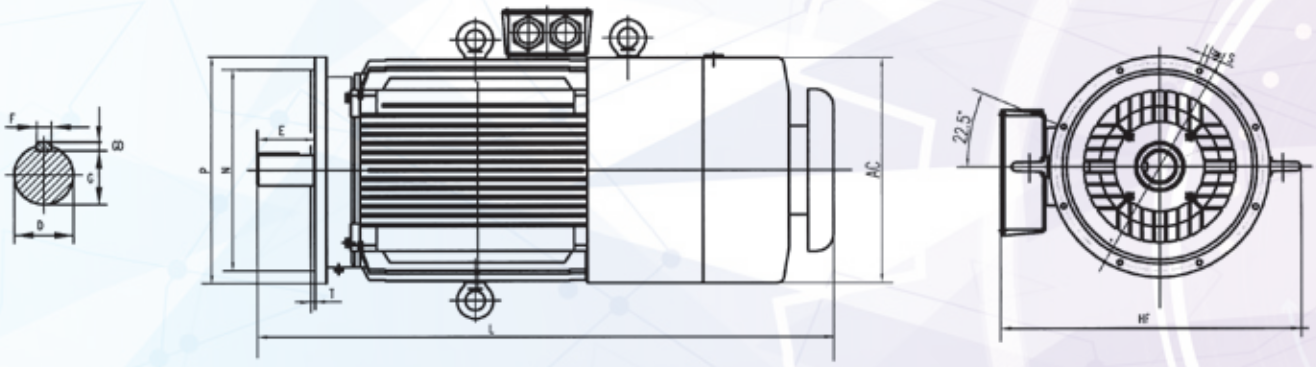
132 – 280



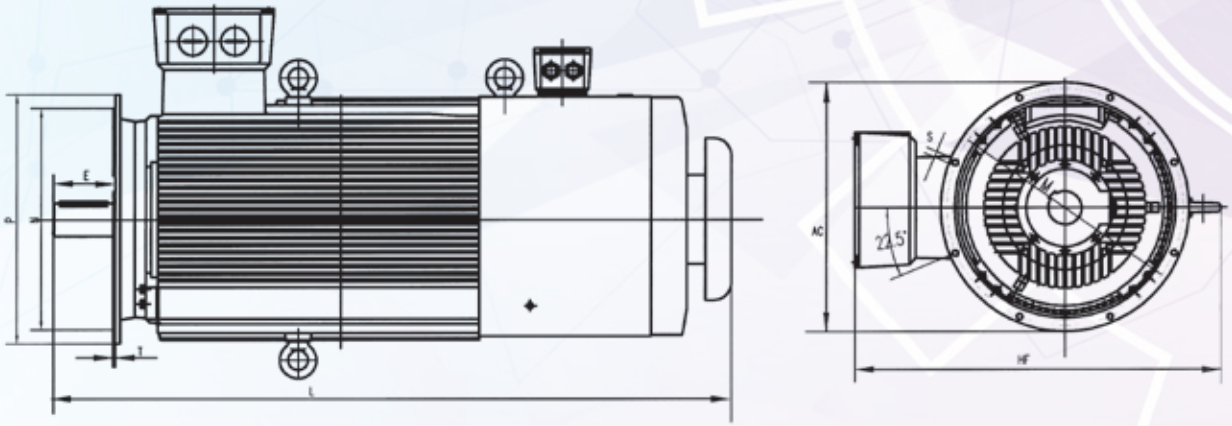
315 –400

MOUNTING DIMENSIONS – IM B5/V1

Frame Size	D	E	FxGD	G	M	N	P	S	T	AC	HF	L
200L	55	110	16x10	49	350	300	400	4x19Ø	5	420	580	1040
225M	60	140	18x11	53	400	350	450	8x19Ø	6	446	640	1150
250M	65	140	18x11	58	500	450	550	8x19Ø	6	495	695	1250
280S	75	140	20x12	67.5	500	450	550	8x19Ø	6	560	770	1385
280M	75	140	20x12	67.5	500	450	550	8x19Ø	6	560	770	1425
315S	80	170	22x14	71	600	550	660	8x24Ø	6	645	975	1815
315M	80	170	22x14	71	600	550	660	8x24Ø	6	645	975	1815
315L	80	170	22x14	71	600	550	660	8x24Ø	6	645	975	1815
355M	100	210	28x16	90	740	680	800	8x24Ø	6	710	1160	2050
355L	100	210	28x16	90	740	680	800	8x24Ø	6	710	1160	2050
400L	110	210	28x16	100	975	925	1060	8x24Ø	10	820	1295	2270

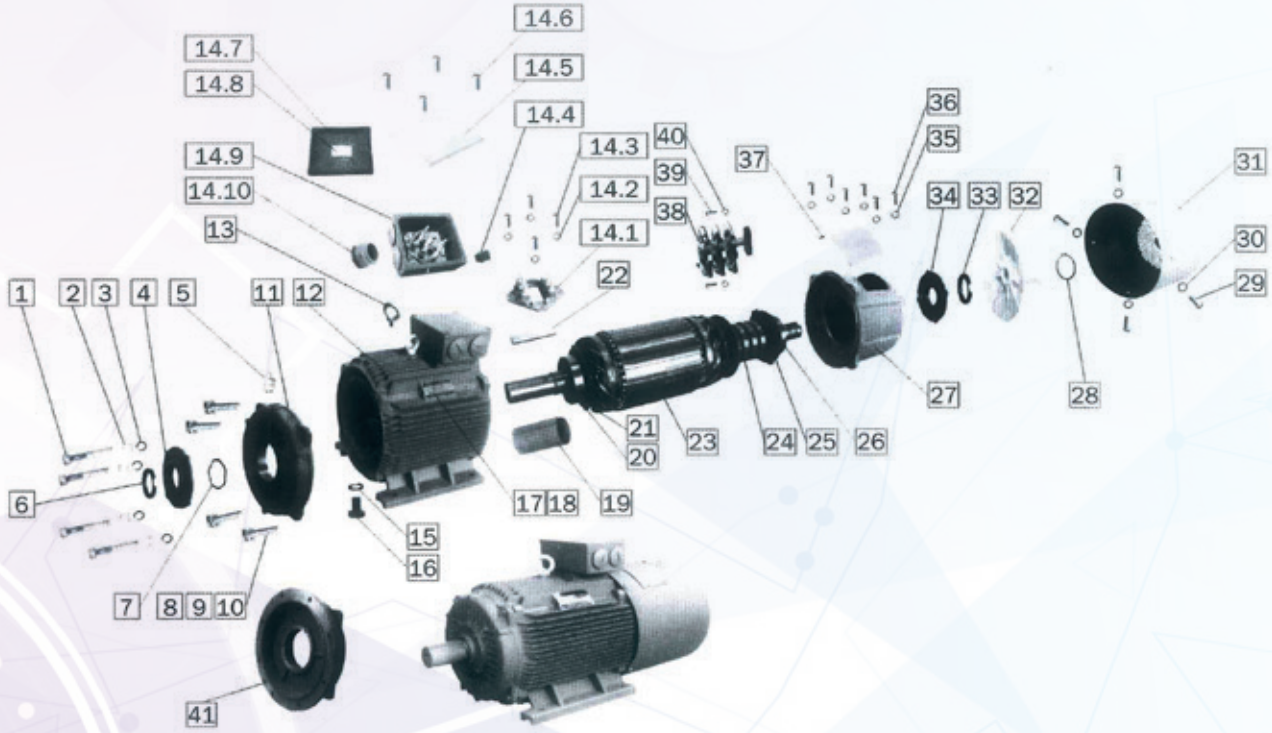


132 – 200



225 – 400

LIST OF BASIC PARTS AND SUBASSEMBLIES FOR MOTORS OF FRAME SIZES 200 ~ 280



ITEM	SPECIFICATION	ITEM	SPECIFICATION
1	Bolt	17	Nameplate
2	Washer	18	Rivet
3	Washer	19	Shaft sleeve
4	Bearing cap	20	Bearing
5	Oil cup	21	Bearing cap
6	Seal Rring	22	Key
7	Wave form elastic washer	23	Rotor
8	Bolt	24	Collector ring
9	Washer	25	Bearing cap
10	Washer	26	Bearing
11	End cover	27	End cover
12	Stator	28	Retainer ring
13	Eyebolt	29	Bolt
14	Terminal box	30	Washer
14.1	Connecting board	31	Fan cover
14.2	Washer	32	Cooling fan
14.3	Screw	33	Seal ring
14.4	Cable inlet	34	Bearing cap
14.5	Terminal box cover	35	Washer
14.6	Screw	36	Screw
14.7	Terminal box seal	37	Cover plate
14.8	Connecting diagram	38	Corbon brush
14.9	Terminal box holder	39	Bolt
14.10	Cable inlet	40	Washer
15	Seal ring	41	Flange
16	Plug screw		

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SLIP-RING MOTORS

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EMPOWER DRIVES AND AUTOMATION SDN. BHD. (1000540-D)
Lot 7792, Kg Baru Subang, Seksyen U9, 40150 Shah Alam.
Tel: 603-7846 9196 Fax: 603-7846 9180
Email: enquiry@empowercorp.com.my
Website: www.empowercorp.com.my

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