

# Tehchnical Documentation



LOW VOLTAGE THREE PHASE  
TEFC CAGE MOTORS

**ATB SEVER**  
Technology in Motion

# Vision



We set your ideas in motion. We do not merely manufacture motors, but instead turn the ambitious concepts of our customers into modern, innovative and reliable products, which are unique and point the way to the future. We bring our customers closer to their goals with reliability, creativity and flexibility.

## Business Units



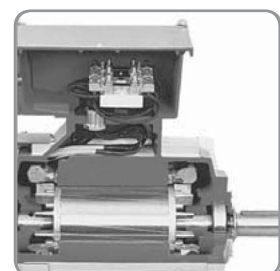
Serial Motors



New Businesses



Home Appliances



Project Motors

# Low voltage three phase totally enclosed fan cooled cage motors

## Electrical Data

1

Mechanical protection: IP 55

Voltage: 400 V, 50 Hz

Type	Output power $P_N$ kW	Rated speed $n_N$ $\text{min}^{-1}$	Efficiency $\eta$ %	Power factor $\cos \varphi$	Rated current $I_N$ A	Rated torque $T_N$ Nm	$I_1/I_N$	$T_1/T_N$	$T_b/T_N$	Torque class KR	Moment of inertia J $\text{kgm}^2$	Mass kg
3000 $\text{min}^{-1}$												
1.ZK 63 A-2	0.18	2700	60.0	0.80	0.54	0.64	3.2	2.0	2.4	16	0.00014	4.2
1.ZK 63 B-2	0.25	2730	62.0	0.80	0.72	0.87	3.5	2.2	2.4	16	0.00017	4.6
1.ZK 71 A-2	0.37	2750	63.0	0.81	1.1	1.30	3.4	2.0	2.2	16	0.00023	5.4
1.ZK 71 B-2	0.55	2760	69.0	0.81	1.4	1.90	4.8	2.2	2.6	16	0.00033	6.3
1.ZK 80 A-2	0.75	2770	71.0	0.80	1.9	2.60	4.8	2.1	2.5	16	0.00055	8.3
1.ZK 80 B-2	1.1	2770	73.0	0.84	2.6	3.80	4.4	2.2	2.3	16	0.00066	9.1
1.ZK 90 S-2	1.5	2810	74.0	0.85	3.4	5.10	5.0	2.2	2.4	16	0.00123	12.5
1.ZK 90 L-2	2.2	2830	80.0	0.85	4.7	7.40	6.0	2.8	3.1	16	0.00184	16
2.ZK 100 L-2	3	2820	78.0	0.83	6.7	10	6.5	2.7	3.2	16	0.00378	19
2.ZK 112 M-2	4	2830	82.0	0.90	7.8	13	7.6	3.2	3.3	16	0.005	24
1.ZK 132 Sk-2	5.5	2840	86.0	0.88	10.7	18	8.5	3.6	3.8	16	0.01	47
1.ZK 132 S-2	7.5	2860	84.0	0.90	14.3	25	8.8	3.7	4.0	16	0.013	56
1.ZK 160 Mk-2	11	2910	86.0	0.87	21	36	8.5	3.7	3.9	16	0.021	89
1.ZK 160 M-2	15	2910	87.0	0.88	29	49	8.5	3.7	3.9	16	0.028	108
1.ZK 160 L-2	18.5	2910	88.0	0.88	34	61	8.9	3.7	3.9	16	0.034	113
1.ZK 180 M-2	22	2920	89.0	0.88	41	72	8.0	3.5	3.4	16	0.057	138
1.ZK 200 Lk-2	30	2935	89.5	0.89	55	98	7.5	3.1	3.1	16	0.11	199
1.ZK 200 L-2	37	2940	90.0	0.88	68	120	7.9	3.2	3.2	16	0.13	215
1.ZK 225 M-2	45	2960	91.5	0.87	82	145	7.2	2.7	2.9	16	0.23	290
1.ZK 250 M-2	55	2960	93.0	0.87	99	177	7.5	2.5	3.0	16	0.36	395
1.ZK 280 S-2	75	2960	93.0	0.89	131	242	7.5	2.1	2.8	16	0.67	510
1.ZK 280 M-2	90	2960	93.5	0.89	156	290	7.5	2.5	3.1	16	0.81	600
1.ZK 315 S-2	110	2970	93.0	0.94	181	354	8.0	1.8	3.7	13	1.17	680
1.ZK 315 M-2	132	2970	93.5	0.93	219	424	8.0	1.8	3.8	13	1.4	840
1.ZKI 315 Mk-2	160	2973	95.0	0.91	270	515	7.0	1.7	2.3	10	2.0	1100
1.ZKI 315 M-2	200	2976	95.5	0.91	335	643	7.5	1.9	2.4	13	2.5	1290
2.ZKI 315 Lk-2	250	2977	96.3	0.93	403	802	7.0	1.8	2.5	10	4.7	1450
2.ZKI 315 L-2	315	2982	96.3	0.93	508	1010	7.5	1.7	2.5	10	5.4	1720
2.ZKI 355 Mk-2	250	2977	96.3	0.91	412	802	7.0	1.3	2.9	10	4.7	1530
2.ZKI 355 M-2	315	2982	96.3	0.92	505	1010	7.5	1.8	3.3	10	5.4	1730
2.ZKI 355 Md-2	355	2982	96.7	0.92	576	1137	7.7	1.8	3.3	10	5.7	1950
2.ZKI 355 Lk-2	400	2982	96.7	0.92	650	1281	8.0	2.0	3.5	10	6.5	2550
2.ZKI 355 L-2	450	2982	96.7	0.92	730	1441	8.2	2.0	3.6	10	6.9	2770
2.ZKI 355 Ld-2	500	2982	96.7	0.92	812	1600	8.2	2.1	3.7	10	7.5	2910
2.ZKI 400 Lk-2	560											
2.ZKI 400 L-2	630											
2.ZKI 400 Ld-2	710											

On request!

$I_1/I_N$  - Locked rotor current ratio,  $T_1/T_N$  - Locked rotor torque ratio,  $T_b/T_N$  - Break down torque ratio, Mass - For IM B3

# Low voltage three phase totally enclosed fan cooled cage motors

## 2 Electrical Data

Mechanical protection: IP 55

Voltage: 400 V, 50 Hz

Type	Output power $P_N$ kW	Rated speed $n_N$ $\text{min}^{-1}$	Efficiency $\eta$ %	Power factor $\cos \varphi$	Rated current $I_N$ A	Rated torque $T_N$ Nm	$I_1/I_N$	$T_1/T_N$	$T_D/T_N$	Torque class KR	Moment of inertia J $\text{kgm}^2$	Mass kg
1500 $\text{min}^{-1}$												
1.ZK 63 A-4	0.12	1310	60.0	0.66	0.44	0.87	3.0	1.8	2.1	13	0.00027	4.4
1.ZK 63 B-4	0.18	1330	63.0	0.74	0.56	1.29	3.2	2.2	2.1	13	0.00037	5
1.ZK 71 A-4	0.25	1340	63.0	0.76	0.75	1.80	3.2	1.7	1.9	13	0.00038	5.3
1.ZK 71 B-4	0.37	1340	62.0	0.75	1.1	2.60	3.5	2.0	2.1	13	0.00055	6.3
1.ZK 80 A-4	0.55	1375	69.0	0.75	1.5	3.80	3.8	1.9	2.0	13	0.0009	8.2
1.ZK 80 B-4	0.75	1375	72.0	0.75	2.0	5.20	3.8	2.1	2.2	13	0.0011	9
1.ZK 90 S-4	1.1	1410	74.0	0.78	2.8	7.50	4.1	2.0	2.3	16	0.0023	13.2
1.ZK 90 L-4	1.5	1405	77.0	0.78	3.6	10	4.6	2.1	2.8	16	0.0032	15.8
2.ZK 100 L-4	2.2	1410	78.0	0.81	5.0	15	5.4	2.2	2.8	16	0.0054	20.5
2.ZK 100 Ld-4	3	1410	76.0	0.80	7.1	20	5.7	2.4	2.7	16	0.0071	22.6
2.ZK 112 M-4	4	1420	81.0	0.82	8.6	27	6.5	2.9	3.0	16	0.013	28.4
1.ZK 132 S-4	5.5	1450	85.0	0.82	11.4	36	6.5	2.5	3.1	16	0.019	53
1.ZK 132 M-4	7.5	1450	86.0	0.80	15.7	49	6.5	2.4	3.2	16	0.025	64
1.ZK 160 M-4	11	1440	88.0	0.83	22	73	6.5	2.8	3.0	16	0.055	89
1.ZK 160 L-4	15	1440	88.0	0.82	30	99.5	6.8	3.0	3.0	16	0.073	118
1.ZK 180 M-4	18.5	1460	88.0	0.82	37	121	6.2	2.8	2.6	16	0.086	140
1.ZK 180 L-4	22	1460	89.0	0.81	44	144	6.2	2.8	2.5	16	0.102	155
1.ZK 200 L-4	30	1470	90.0	0.84	57	195	7.5	2.9	2.8	16	0.27	230
1.ZK 225 S-4	37	1470	92.0	0.83	70	240	6.2	2.3	2.3	16	0.362	280
1.ZK 225 M-4	45	1470	92.0	0.82	83	292	6.2	2.3	2.5	16	0.442	320
1.ZK 250 M-4	55	1480	92.5	0.85	101	355	6.2	2.1	2.4	16	0.64	415
1.ZK 280 S-4	75	1480	93.0	0.86	135	486	7.0	2.4	2.4	16	1.1	545
1.ZK 280 M-4	90	1480	93.0	0.86	162	581	7.0	2.4	2.4	16	1.31	603
1.ZK 315 S-4	110	1482	93.7	0.92	184	710	7.0	1.9	2.4	13	2.12	750
1.ZK 315 M-4	132	1477	94.0	0.92	221	855	6.8	1.9	2.4	13	2.54	850
1.ZKI 315 Mk-4	160	1486	94.5	0.90	275	1030	7.3	2.0	2.8	13	3.6	1087
1.ZKI 315 M-4	200	1486	95.0	0.91	335	1285	7.0	1.7	2.2	13	4.3	1208
2.ZKI 315 Lk-4	250	1488	95.2	0.87	436	1605	7.8	1.9	2.9	13	5.0	1450
2.ZKI 315 L-4	315	1487	95.4	0.88	542	2023	7.7	2.0	2.8	13	6.0	1720
2.ZKI 355 Mk-4	250	1491	95.7	0.90	419	1600	7.3	2.0	3.0	10	7.6	1750
2.ZKI 355 M-4	315	1492	96.0	0.90	535	2016	7.3	2.1	3.2	13	9.9	1930
2.ZKI 355 Md-4	355	1492	96.2	0.89	592	2272	8.3	2.5	3.2	13	13.0	2150
2.ZKI 355 Lk-4	400	1492	96.3	0.90	666	2560	8.4	2.6	3.3	13	14.5	2545
2.ZKI 355 L-4	450	1492	96.4	0.90	748	2880	8.5	2.6	3.3	13	17.0	2770
2.ZKI 355 Ld-4	500	1492	96.5	0.91	822	3200	8.5	2.6	3.3	13	19.0	2920
2.ZKI 400 Lk-4	560											
2.ZKI 400 L-4	630											
2.ZKI 400 Ld-4	710											

On request!

$I_1/I_N$  - Locked rotor current ratio,  $T_1/T_N$  - Locked rotor torque ratio,  $T_D/T_N$  - Break down torque ratio, Mass - For IM B3

# Low voltage three phase totally enclosed fan cooled cage motors

## Electrical Data

3

Mechanical protection: IP 55

Voltage: 400 V, 50 Hz

Type	Output power $P_N$ kW	Rated speed $n_N$ $\text{min}^{-1}$	Efficiency $\eta$ %	Power factor $\cos \varphi$	Rated current $I_N$ A	Rated torque $T_N$ Nm	$I_1/I_N$	$T_1/T_N$	$T_b/T_N$	Torque class KR	Moment of inertia J $\text{kgm}^2$	Mass kg
1000 $\text{min}^{-1}$												
1.ZK 63 A-6	0.09	870	44.0	0.68	0.45	0.98	2.1	1.7	1.8	13	0.00027	4.4
1.ZK 63 B-6	0.12	880	43.0	0.63	0.64	1.3	2.3	2.2	2.6	13	0.00037	5
1.ZK 71 A-6	0.18	900	57.0	0.65	0.70	1.9	2.6	1.9	2.0	13	0.00055	6.1
1.ZK 71 B-6	0.25	890	57.0	0.64	1.0	2.7	2.6	1.8	2.1	13	0.00071	6.8
1.ZK 80 A-6	0.37	910	62.0	0.69	1.2	3.9	3.3	2.0	2.2	13	0.0018	9
1.ZK 80 B-6	0.55	910	68.0	0.66	1.8	5.7	3.5	2.4	2.4	13	0.0024	11.6
1.ZK 90 S-6	0.75	920	70.0	0.72	2.1	7.8	3.3	1.9	2.1	16	0.0037	13
1.ZK 90 L-6	1.1	910	70.0	0.70	3.3	11.2	3.8	2.2	2.4	16	0.0054	16.3
2.ZK 100 L-6	1.5	920	72.0	0.75	4.0	16.0	4.2	2.1	2.2	13	0.0054	20.5
2.ZK 112 M-6	2.2	930	76.0	0.75	5.6	23.0	4.5	2.0	2.1	16	0.012	27
1.ZK 132 S-6	3	940	77.0	0.78	7.2	30.0	4.5	2.0	2.1	13	0.015	47
1.ZK 132 Mk-6	4	940	82.0	0.77	9.1	40.2	4.5	1.9	2.0	13	0.02	57
1.ZK 132 M-6	5.5	950	83.0	0.77	12.4	55.3	4.5	1.9	2.1	13	0.028	68
1.ZK 160 M-6	7.5	950	84.0	0.77	17	75	5.5	2.0	2.4	16	0.049	90
1.ZK 160 L-6	11	950	84.0	0.78	24.5	110	6.0	2.2	2.5	16	0.07	120
1.ZK 180 L-6	15	960	87.0	0.82	30.5	149	6.0	2.2	2.7	16	0.144	150
1.ZK 200 Lk-6	18.5	970	89.0	0.81	38	182	6.5	2.0	2.7	16	0.225	205
1.ZK 200 L-6	22	970	90.0	0.80	44	217	6.5	2.0	2.7	16	0.27	230
1.ZK 225 M-6	30	975	91.0	0.81	59	294	6.5	2.0	2.7	16	0.656	330
1.ZK 250 M-6	37	980	91.0	0.83	71	361	6.0	2.0	2.2	13	0.9	390
1.ZK 280 S-6	45	982	92.5	0.85	83	438	6.9	2.4	2.8	16	1.5	500
1.ZK 280 M-6	55	982	93.0	0.84	102	533	6.9	2.3	2.6	16	1.82	560
1.ZK 315 S-6	75	987	92.7	0.87	134	725	7.3	2.2	2.6	16	2.7	720
1.ZK 315 M-6	90	988	93.0	0.88	160	870	7.5	2.2	2.6	16	3.18	840
1.ZKI 315 Mk-6	110	987	94.0	0.87	195	1064	6.5	1.75	2.4	16	5.5	1035
1.ZKI 315 M-6	132	988	94.5	0.87	235	1276	7.0	1.8	2.6	16	6.6	1140
1.ZKI 315 Md-6	160	989	95.0	0.87	280	1545	7.0	2.0	2.7	16	7.0	1260
2.ZKI 315 Lk-6	200	987	94.9	0.84	362	1935	7.2	2.3	2.5	13	7.49	1450
2.ZKI 315 L-6	250	986	95.0	0.85	447	2421	7.0	2.2	2.4	13	9.32	1720
2.ZKI 355 Mk-6	200	989	95.7	0.87	348	1930	6.2	2.3	2.5	13	13.1	1636
2.ZKI 355 M-6	250	988	95.7	0.87	436	2417	6.1	2.3	2.5	13	14.9	1950
2.ZKI 355 Md-6	315	988	95.7	0.88	540	3045	6.2	2.3	2.5	13	16.5	2240
2.ZKI 355 Lk-6	355	990	95.9	0.89	600	3425	6.5	2.3	2.6	13	18	2767
2.ZKI 355 L-6	400	990	96.0	0.89	676	3858	6.8	2.3	2.6	13	20	2990
2.ZKI 400 Lk-6	450											
2.ZKI 400 L-6	500											
2.ZKI 400 Ld-6	560											

On request!

$I_1/I_N$  - Locked rotor current ratio,  $T_1/T_N$  - Locked rotor torque ratio,  $T_b/T_N$  - Break down torque ratio, Mass - For IM B3

# Low voltage three phase totally enclosed fan cooled cage motors

## 4 Electrical Data

Mechanical protection: IP 55

Voltage: 400 V, 50 Hz

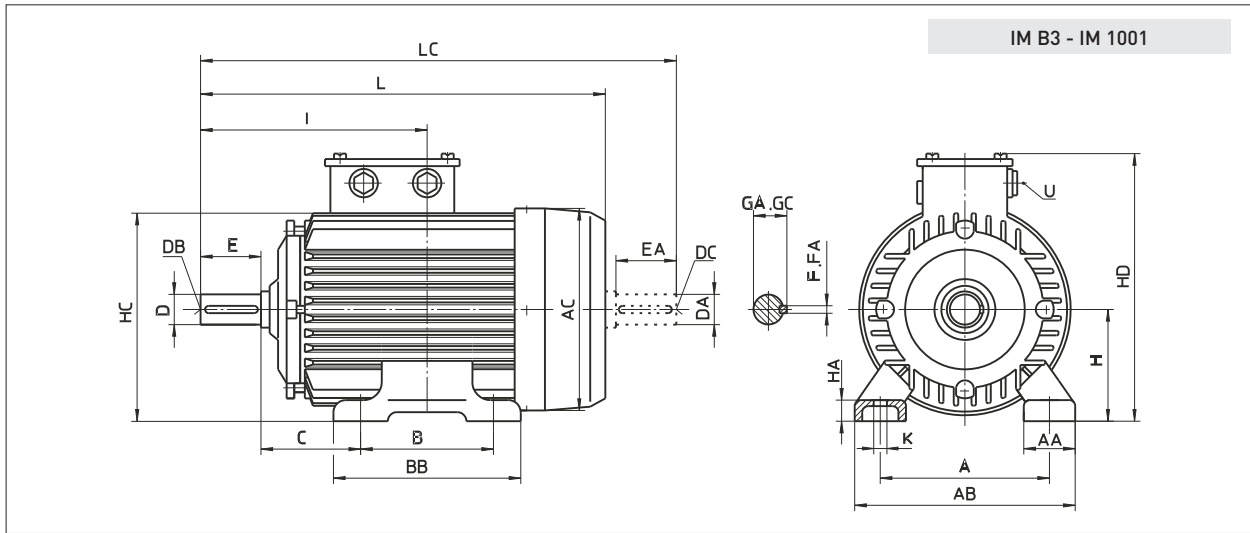
Type	Output power $P_N$ kW	Rated speed $n_N$ $\text{min}^{-1}$	Efficiency $\eta$ %	Power factor $\cos \varphi$	Rated current $I_N$ A	Rated torque $T_N$ Nm	$I_1/I_N$	$T_1/T_N$	$T_b/T_N$	Torque class KR	Moment of inertia J $\text{kgm}^2$	Mass kg
750 $\text{min}^{-1}$												
1.ZK 63 A-8	0.055	610	34	0.66	0.35	0.9	1.8	1.7	1.8	13	0.00027	4.4
1.ZK 71 A-8	0.09	670	43.0	0.50	0.60	1.3	2.2	1.8	2.0	16	0.00055	6.1
1.ZK 71 B-8	0.12	680	46.0	0.50	0.75	1.7	2.2	1.9	2.2	16	0.00071	6.8
1.ZK 80 A-8	0.18	680	55.0	0.55	0.86	2.5	2.8	2.2	2.5	16	0.0018	9
1.ZK 80 B-8	0.25	680	59.0	0.56	1.10	3.5	2.8	2.3	2.5	16	0.0024	11.6
1.ZK 90 S-8	0.37	700	57.0	0.62	1.5	5.0	2.9	1.7	1.8	13	0.0037	13
1.ZK 90 L-8	0.55	700	61.0	0.61	2.1	7.5	3.0	2.0	2.0	13	0.0054	16.3
2.ZK 100 L-8	0.75	690	64.0	0.67	2.5	10.0	3.7	2.0	2.4	13	0.0054	20.5
2.ZK 100 Ld-8	1.1	670	64.0	0.70	3.5	15.7	3.5	2.1	2.4	13	0.0071	22.6
2.ZK 112 M-8	1.5	680	69.0	0.71	4.4	21	3.6	1.8	2.2	13	0.012	27
1.ZK 132 S-8	2.2	700	72.0	0.72	6.1	30	3.6	1.8	2.1	13	0.015	47
1.ZK 132 M-8	3	700	76.0	0.72	7.9	40	4.0	1.8	2.1	13	0.028	68
1.ZK 160 Mk-8	4	710	78.0	0.68	11.1	54	4.3	1.9	2.2	13	0.037	87
1.ZK 160 M-8	5.5	710	79.0	0.68	15	74	4.4	1.9	2.2	13	0.053	91.5
1.ZK 160 L-8	7.5	710	81.0	0.70	19	101	4.4	1.9	2.2	13	0.076	122
1.ZK 180 L-8	11	715	84.0	0.72	26.5	148	4.4	1.9	2.1	13	0.16	160
1.ZK 200 L-8	15	725	87.0	0.70	36	199	5.0	1.8	2.2	13	0.225	205
1.ZK 225 S-8	18.5	735	88.5	0.75	41	240	4.8	1.7	2.2	13	0.47	245
1.ZK 225 M-8	22	735	89.5	0.75	48	286	4.8	1.6	2.3	13	0.56	285
1.ZK 250 M-8	30	735	89.5	0.78	62	390	5.0	1.6	2.2	13	0.87	370
1.ZK 280 S-8	37	735	92.0	0.78	75	481	5.1	1.6	2.0	13	1.5	495
1.ZK 280 M-8	45	735	92.0	0.78	91	585	5.1	1.6	2.0	13	1.82	580
1.ZK 315 S-8	55	739	92.5	0.81	106	710	6.8	2.0	2.6	10	2.56	750
1.ZK 315 M-8	75	740	92.8	0.81	145	970	6.8	2.0	2.6	10	3.32	803
1.ZKI 315 Mk-8	90	742	93.5	0.78	180	1158	5.7	2.0	2.6	10	6.3	1045
1.ZKI 315 M-8	110	742	93.5	0.79	215	1416	5.5	2.0	2.5	10	7.8	1150
1.ZKI 315 Md-8	132	742	94.0	0.79	260	1699	5.5	2.0	2.5	10	8.9	1270
2.ZKI 315 Lk-8	160	739	94.2	0.81	301	2068	6.5	1.4	2.7	13	7.49	1450
2.ZKI 315 L-8	200	739	94.5	0.80	382	2585	6.8	1.5	2.9	13	9.32	1720
2.ZKI 355 Mk-8	160	743	95.4	0.82	297	2060	6.0	2.0	2.9	13	19.2	1825
2.ZKI 355 M-8	200	744	95.5	0.82	367	2570	6.0	2.1	3.0	13	22.4	2090
2.ZKI 355 Md-8	250	744	95.6	0.82	462	3209	6.1	2.1	3.0	13	26.2	2440
2.ZKI 355 Lk-8	315	745	95.7	0.82	580	4038	6.1	2.1	3.0	13	28	2810
2.ZKI 355 L-8	355	745	95.8	0.82	653	4550	6.2	2.1	3.1	13	30	3035
2.ZKI 400 Lk-8	400											
2.ZKI 400 L-8	450											
2.ZKI 400 Ld-8	500											

On request!

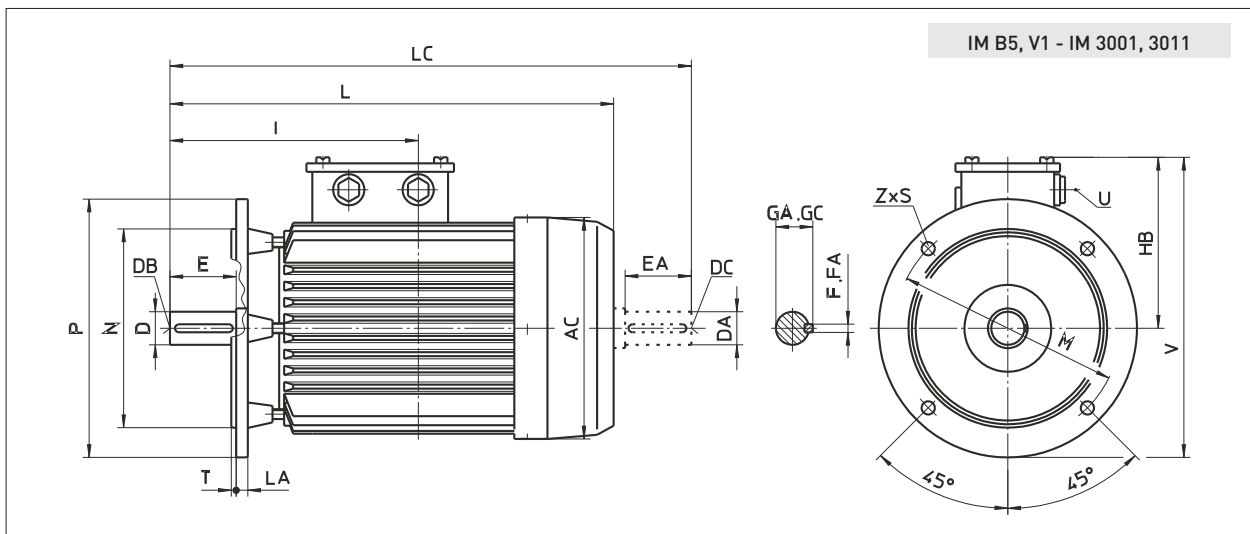
$I_1/I_N$  - Locked rotor current ratio,  $T_1/T_N$  - Locked rotor torque ratio,  $T_b/T_N$  - Break down torque ratio, Mass - For IM B3

# Low voltage three phase totally enclosed fan cooled cage motors

## Electrical Data



Type	Pole	A	AA	AB	AC	B	BB	C	D	DA	DB	DC	E	EA	F	FA	GA	GC	H	HA	HC	HD	I	K	L	LC	U	
1.ZK 63	2,4,6,8	<b>100</b>	24	124	125	<b>80</b>	106	<b>40</b>	<b>11</b>	11	M4	M4	<b>23</b>	23	<b>4</b>	<b>4</b>	<b>12.5</b>	12.5	<b>63</b>	8	123	160	103	<b>7</b>	213	240	M20 x 1.5	
1.ZK 71	2,4,6,8	<b>112</b>	34	142	140	<b>90</b>	114	<b>45</b>	<b>14</b>	11	M5	M4	<b>30</b>	23	<b>5</b>	<b>4</b>	<b>16</b>	12.5	<b>71</b>	8	142	176	120	<b>7</b>	241	267	M20 x 1.5	
1.ZK 80	2,4,6,8	<b>125</b>	38	155	154	<b>100</b>	130	<b>50</b>	<b>19</b>	14	M6	M5	<b>40</b>	30	<b>6</b>	<b>5</b>	<b>21.5</b>	16	<b>80</b>	9	158	190	140	<b>10</b>	274	307	M20 x 1.5	
1.ZK 90	$\frac{S}{L}$	2,4,6,8	<b>140</b>	40	180	170	$\frac{100}{125}$	$\frac{130}{155}$	<b>56</b>	<b>24</b>	24	M8	M8	<b>50</b>	50	<b>8</b>	<b>8</b>	<b>27</b>	27	<b>90</b>	12	177	211	$\frac{156}{168.5}$	<b>10</b>	$\frac{307}{332}$	$\frac{360}{385}$	M25 x 1.5

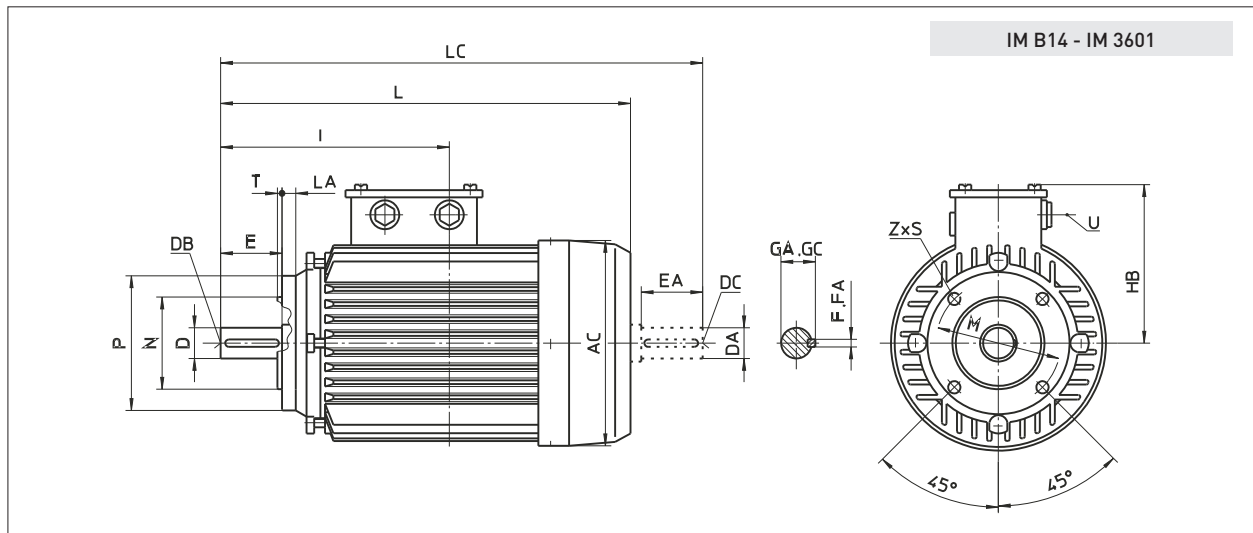


Type	Pole	Flange	AC	D	DA	DB	DC	E	EA	F	FA	GA	GC	HB	I	L	LA	LC	M	N	P	S	Z	T	V	U
1.ZK 63	2,4,6,8	FF 115	125	<b>11</b>	11	M4	M4	<b>23</b>	23	<b>4</b>	<b>4</b>	<b>12.5</b>	12.5	97	103	213	8	240	<b>115</b>	<b>95</b>	<b>140</b>	$\varnothing 10$	<b>4</b>	<b>3</b>	167	M20 x 1.5
1.ZK 71	2,4,6,8	FF 130	140	<b>14</b>	11	M5	M4	<b>30</b>	23	<b>5</b>	<b>4</b>	<b>16</b>	12.5	105	120	241	10	267	<b>130</b>	<b>110</b>	<b>160</b>	$\varnothing 10$	<b>4</b>	<b>3.5</b>	185	M20 x 1.5
1.ZK 80	2,4,6,8	FF 165	154	<b>19</b>	14	M6	M5	<b>40</b>	30	<b>6</b>	<b>5</b>	<b>21.5</b>	16	110	140	274	12	307	<b>165</b>	<b>130</b>	<b>200</b>	$\varnothing 12$	<b>4</b>	<b>3.5</b>	210	M20 x 1.5
1.ZK 90	$\frac{S}{L}$	FF 165	170	<b>24</b>	24	M8	M8	<b>50</b>	50	<b>8</b>	<b>8</b>	<b>27</b>	27	121	$\frac{156}{168.5}$	$\frac{307}{332}$	12	$\frac{360}{385}$	<b>165</b>	<b>130</b>	<b>200</b>	$\varnothing 12$	<b>4</b>	<b>3.5</b>	221	M25 x 1.5

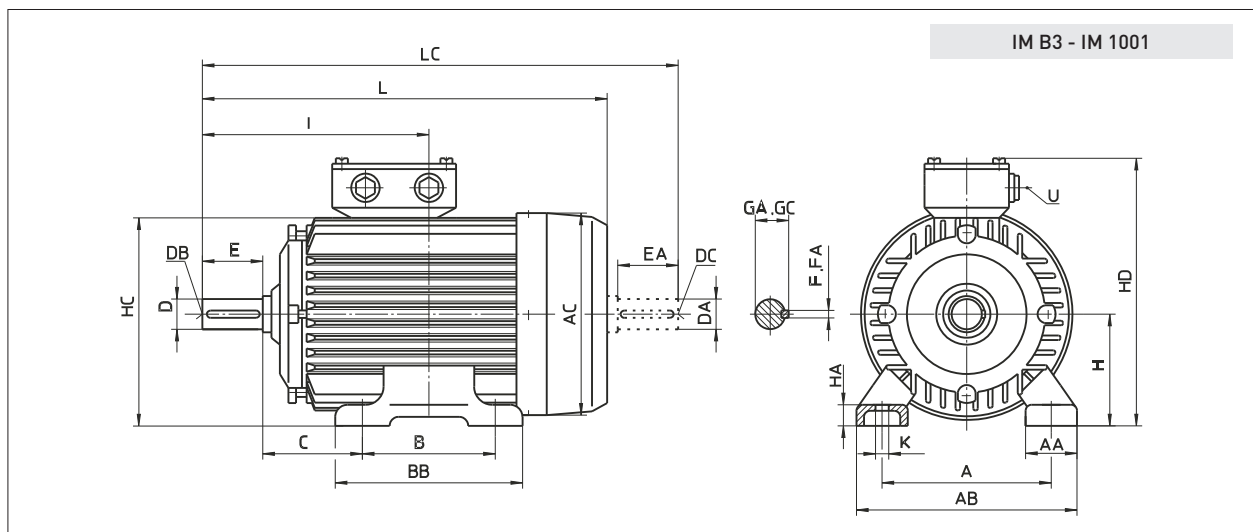
The dimensions given in bold figures are obligatory according to the recommendation of IEC. All other technical data and dimensions during the future development of motors may undergo some changes and therefore they can be considered as obligatory after our confirmation only. All dimensions are given in millimetres.

# Low voltage three phase totally enclosed fan cooled cage motors

## 6 Motor dimensions



Type	Pole	Flange	AC	D	DA	DB	DC	E	EA	F	FA	GA	GC	HB	I	L	LA	LC	M	N	P	S	Z	T	U
1.ZK 63	2,4,6,8	FT 75	125	11	11	M4	M4	23	23	4	4	12.5	12.5	97	103	213	8	240	75	60	90	M5	4	2.5	M20 x 1.5
		FT 100	100	11	11	M4	M4	23	23	4	4	12.5	12.5	97	103	213	8	240	100	80	120	M6	4	3	
1.ZK 71	2,4,6,8	FT 85	140	14	11	M5	M4	30	23	5	4	16	12.5	105	120	241	8	267	85	70	105	M6	4	2.5	M20 x 1.5
		FT 115	115	14	11	M5	M4	30	23	5	4	16	12.5	105	120	241	10	267	115	95	140	M8	4	3	
1.ZK 80	2,4,6,8	FT 100	154	19	14	M6	M5	40	30	6	5	21.5	16	110	140	274	10	304	100	80	120	M6	4	3	M20 x 1.5
		FT 130	130	19	14	M6	M5	40	30	6	5	21.5	16	110	140	274	12	304	130	110	160	M8	4	3.5	
1.ZK 90	S	FT 115	170	24	24	M8	M8	50	50	8	8	27	27	121	156	307	10	360	115	95	140			3.5	M25 x 1.5
		FT 130	130	24	24	M8	M8	50	50	8	8	27	27	121	156	307	10	360	130	110	160	M8	4	3.5	
	L	FT 115	170	24	24	M8	M8	50	50	8	8	27	27	121	168.5	332	10	385	115	95	140			3.5	
		FT 130	130	24	24	M8	M8	50	50	8	8	27	27	121	168.5	332	10	385	130	110	160			3.5	



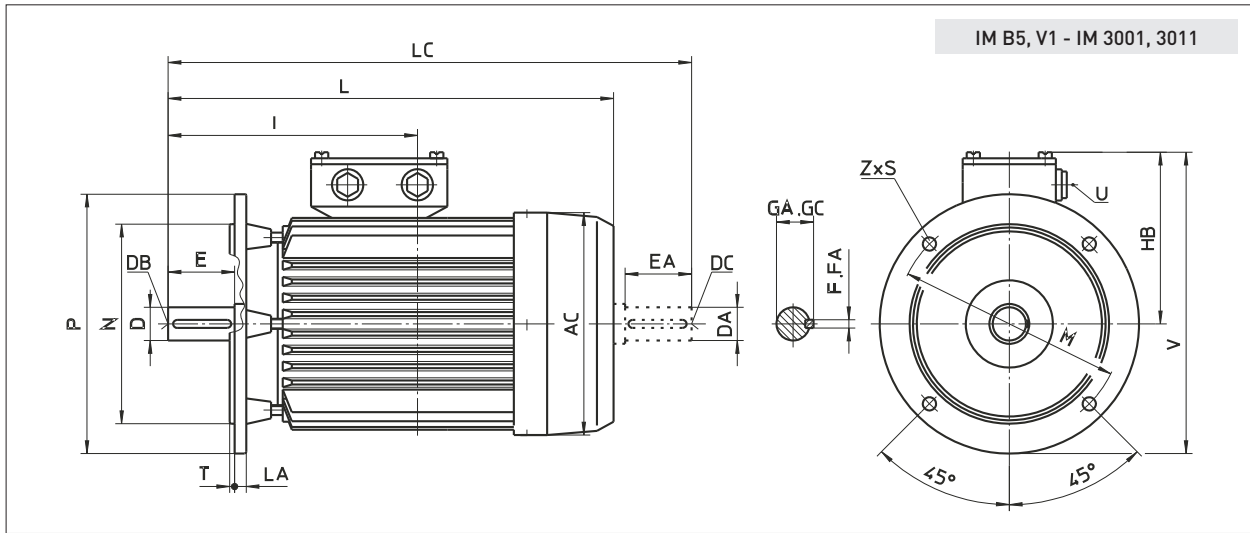
Type	Pole	A	AA	AB	AC	B	BB	C	D	DA	DB	DC	E	EA	F	FA	GA	GC	H	HA	HC	HD	I	K	L	LC	U
2.ZK 100 L	2,4,6,8	160	44	204	193	140	175	63	28	28	M10	M10	60	60	8	8	31	31	100	14	194	257	193	12	370	438	M25 x 1.5
2.ZK 100 Ld	4,8	160	44	204	193	140	175	63	28	28	M10	M10	60	60	8	8	31	31	100	14	194	257	193	12	370	438	M25 x 1.5
2.ZK 112 M	2,4,6,8	190	46	236	216	140	175	70	28	28	M10	M10	60	60	8	8	31	31	112	16	218	281	200	12	380	445	M25 x 1.5

The dimensions given in bold figures are obligatory according to the recommendation of IEC. All other technical data and dimensions during the future development of motors may undergo some changes and therefore they can be considered as obligatory after our confirmation only. All dimensions are given in millimetres.

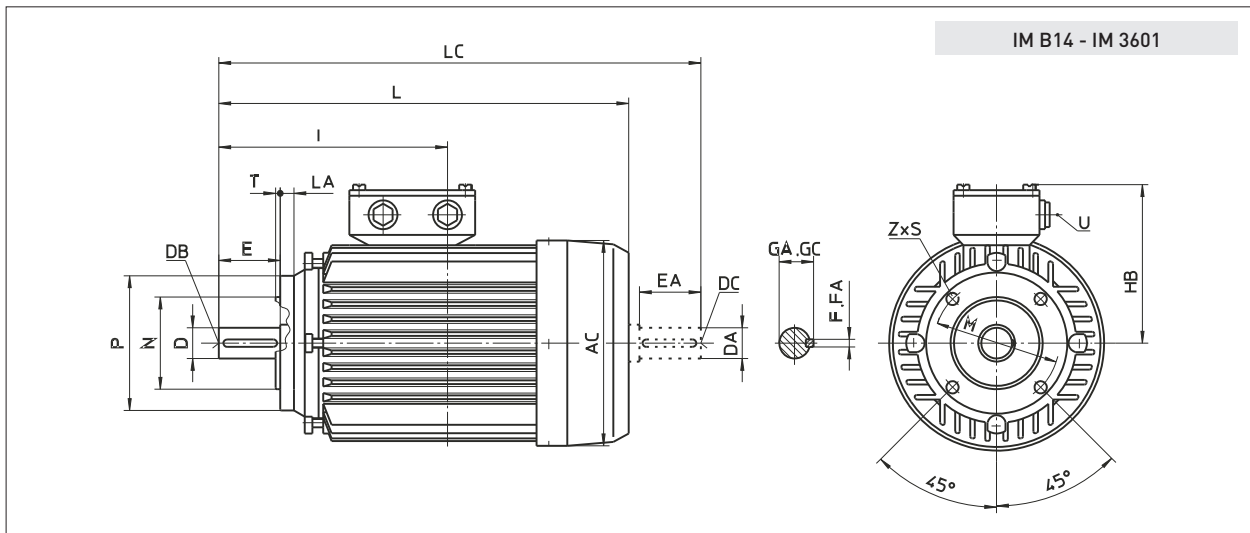


# Low voltage three phase totally enclosed fan cooled cage motors

## Motor dimensions



Type	Pole	Flange	AC	D	DA	DB	DC	E	EA	F	FA	GA	GC	HB	I	L	LA	LC	M	N	P	S	Z	T	V	U
2.ZK 100 L	2,4,6,8																									
2.ZK 100 Ld	4,8	FF 215	193	<b>28</b>	28	M10	M10	<b>60</b>	60	<b>8</b>	8	<b>31</b>	31	157	193	370	15	438	<b>215</b>	<b>180</b>	<b>250</b>	<b>Ø14.5</b>	<b>4</b>	<b>4</b>	282	M25 x 1.5
2.ZK 112 M	2,4,6,8																									
			216	<b>28</b>	28	M10	M10	<b>60</b>	60	<b>8</b>	8	<b>31</b>	31	169	200	380	16	445	<b>215</b>	<b>180</b>	<b>250</b>	<b>Ø14.5</b>	<b>4</b>	<b>4</b>	294	M25 x 1.5



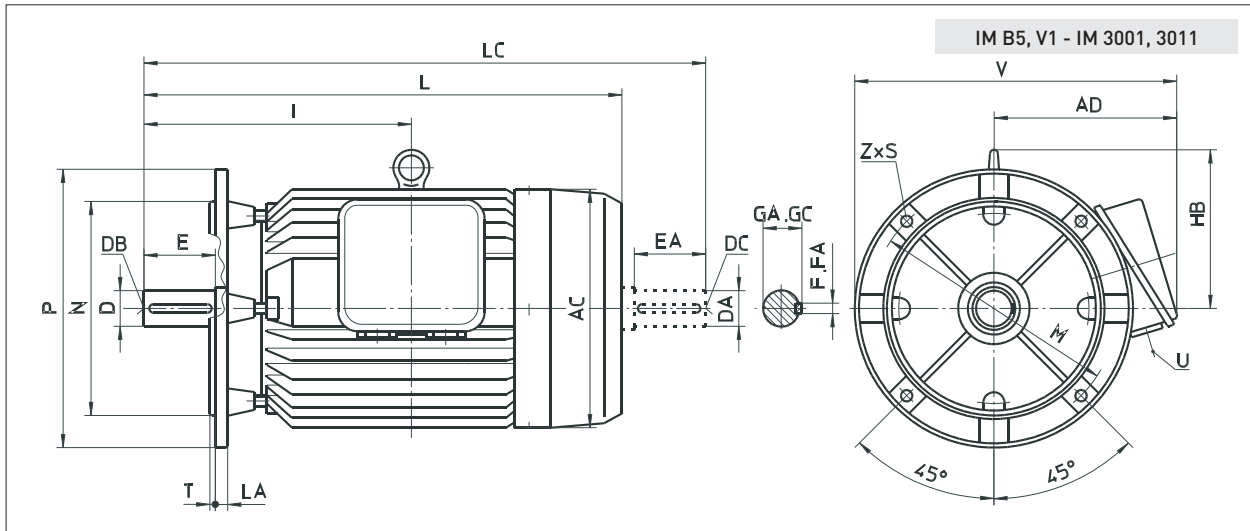
Type	Pole	Flange	AC	D	DA	DB	DC	E	EA	F	FA	GA	GC	HB	I	L	LA	LC	M	N	P	S	Z	T	U
2.ZK 100 L	2,4,6,8	FT 130 FT 165																							
			193	<b>28</b>	28	M10	M10	<b>60</b>	60	<b>8</b>	8	<b>31</b>	31	157	193	370		438	<b>130</b>	<b>110</b>	<b>160</b>	<b>M8</b>	<b>4</b>		
2.ZK 100 Ld	4,8	FT 130 FT 165																							
																			<b>130</b>	<b>110</b>	<b>160</b>	<b>M8</b>	<b>4</b>	<b>3.5</b>	M25 x 1.5
																			<b>165</b>	<b>130</b>	<b>200</b>	<b>M10</b>	<b>4</b>		
2.ZK 112 M	2,4,6,8	FT 130 FT 165																							
			216	<b>28</b>	28	M10	M10	<b>60</b>	60	<b>8</b>	8	<b>31</b>	31	169	200	380		445	<b>130</b>	<b>110</b>	<b>160</b>	<b>M8</b>	<b>4</b>	<b>3.5</b>	M25 x 1.5
																			<b>165</b>	<b>130</b>	<b>200</b>	<b>M10</b>	<b>4</b>		

The dimensions given in bold figures are obligatory according to the recommendation of IEC. All other technical data and dimensions during the future development of motors may undergo some changes and therefore they can be considered as obligatory after our confirmation only. All dimensions are given in millimetres.



# Low voltage three phase totally enclosed fan cooled cage motors

## Motor dimensions

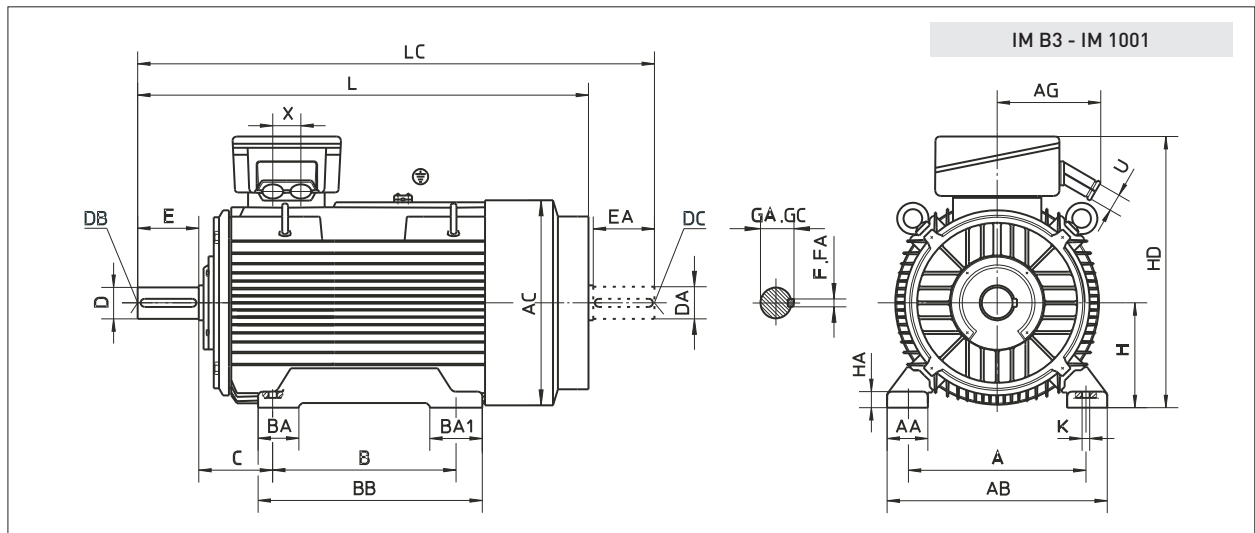


Type	Pole	Flange	AC	AD	D	DA	DB	DC	E	EA	F	FA	GA	GC	HB	I	L	LA	LC	M	N	P	S	Z	T	V	U	
1.ZK 132	Sk	2														239	441		529									
	S	2,4,6,8	FF 265	247	190	<b>38</b>	38	M12	M12	<b>80</b>	80	<b>10</b>	10	<b>41</b>	41	159		16		<b>265</b>	<b>230</b>	<b>300</b>	Ø14.5	<b>4</b>	<b>4</b>	340	M32 x 1.5	
	Mk	6														258	479		567									
	M	4,6,8																										
1.ZK 160	Mk	2,8																										
	M	2,4,6,8	FF 300	285	246	<b>42</b>	42	M16	M16	<b>110</b>	110	<b>12</b>	12	<b>45</b>	45	185		20	<b>709</b>	<b>300</b>	<b>250</b>	<b>350</b>	Ø18.5	<b>4</b>	<b>4</b>	421	M40 x 1.5	
	L	2,4,6,8														345	633		753									
1.ZK 180	M	2,4	FF 300	323	260	<b>48</b>	48	M16	M16	<b>110</b>	110	<b>14</b>	14	<b>51.5</b>	51.5	207		20	<b>772</b>	<b>300</b>	<b>250</b>	<b>350</b>	Ø18.5	<b>4</b>	<b>5</b>	435	M40 x 1.5	
	L	4,6,8														351.5	652		810									
	Lk	2,6	FF 350	369	299	<b>55</b>	55	M20	M20	<b>110</b>	110	<b>16</b>	16	<b>59</b>	59	240	395.5	764	20	<b>876</b>	<b>350</b>	<b>300</b>	<b>400</b>	Ø18.5	<b>4</b>	<b>5</b>	499	M50 x 1.5
1.ZK 200	L	2,4,6,8																										
	S	4,8				<b>60</b>	<b>60</b>			<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>64</b>	<b>64</b>		432	805		<b>962</b>								
	M	2	FF 400	418	337	<b>55</b>	<b>55</b>	M20	M20	<b>110</b>	110	<b>16</b>	16	<b>59</b>	59	275	414.5	800	20	<b>927</b>	<b>400</b>	<b>350</b>	<b>450</b>	Ø18.5	<b>8</b>	<b>5</b>	537	M50 x 1.5
1.ZK 225	M	4,6,8				<b>60</b>	<b>60</b>			<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>64</b>	<b>64</b>		444.5	830		<b>987</b>								
	M	2	FF 500	474	360	<b>60</b>	<b>60</b>	M20	M20	<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>64</b>	<b>64</b>	299	482.5	906	22	<b>1060</b>	<b>500</b>	<b>450</b>	<b>550</b>	Ø18.5	<b>8</b>	<b>5</b>	635	M50 x 1.5
	L	4,6,8				<b>65</b>	<b>65</b>			<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>69</b>	<b>69</b>													
1.ZK 250	M	2				<b>65</b>	<b>65</b>			<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>69</b>	<b>69</b>													
	S	2				<b>65</b>	<b>65</b>			<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>69</b>	<b>69</b>		514	973		<b>1128</b>								
	M	4,6,8	FF 500	510	379	<b>75</b>	<b>75</b>	M20	M20	<b>140</b>	<b>140</b>	<b>20</b>	<b>20</b>	<b>79.5</b>	<b>79.5</b>	327			22	<b>1179</b>	<b>500</b>	<b>450</b>	<b>550</b>	Ø18.5	<b>8</b>	<b>5</b>	654	M50 x 1.5
1.ZK 280	M	2				<b>65</b>	<b>65</b>			<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>69</b>	<b>69</b>		539.5	1024		<b>1179</b>								
	M	4,6,8				<b>75</b>	<b>75</b>			<b>140</b>	<b>140</b>	<b>20</b>	<b>20</b>	<b>79.5</b>	<b>79.5</b>													
	S	2				<b>65</b>	<b>65</b>			<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>69</b>	<b>69</b>		559	1072		<b>1232</b>								
1.ZK 315	S	4,6,8	FF 600	562	427	<b>80</b>	<b>80</b>	M20	M20	<b>170</b>	<b>170</b>	<b>22</b>	<b>22</b>	<b>85</b>	<b>85</b>	345	589	1102	25	<b>1292</b>	<b>600</b>	<b>550</b>	<b>660</b>	Ø24	<b>8</b>	<b>6</b>	757	M63 x 1.5
	M	2				<b>65</b>	<b>65</b>			<b>140</b>	<b>140</b>	<b>18</b>	<b>18</b>	<b>69</b>	<b>69</b>		584.5	1123		<b>1283</b>								
	L	4,6,8				<b>80</b>	<b>80</b>			<b>170</b>	<b>170</b>	<b>22</b>	<b>22</b>	<b>85</b>	<b>85</b>		614.5	1153		<b>1328</b>								

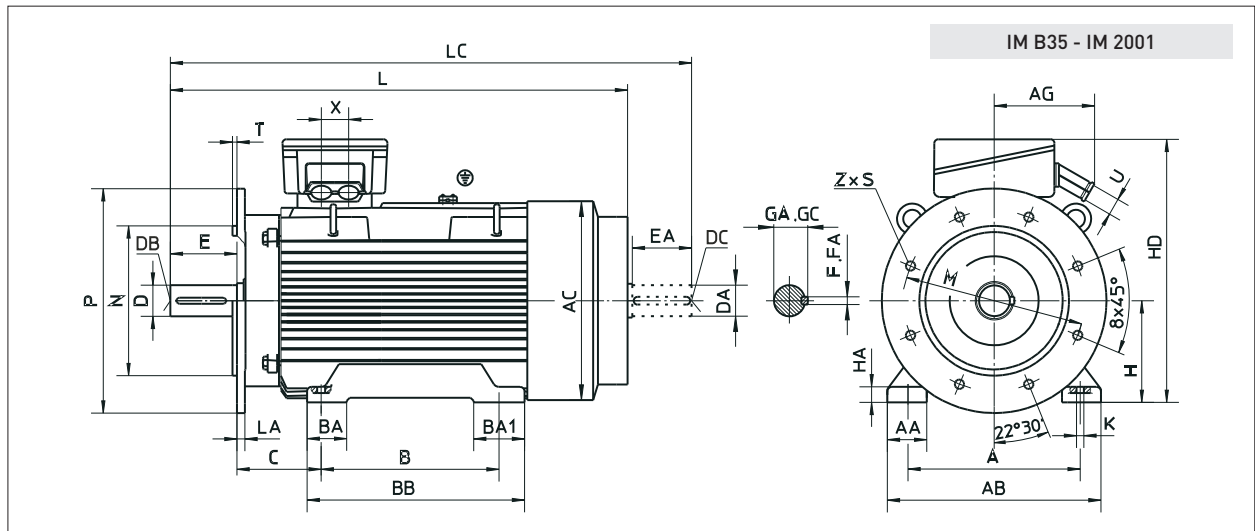
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# Low voltage three phase totally enclosed fan cooled cage motors

## 10 Motor dimensions



Type	Pole	A	AA	AB	AC	AG	B	BA	BA1	BB	C	D	DA	DB	DC	E	EA	F	FA	GA	GC	H	HA	HD	K	L	LC	U	X	
1(2).ZKI 315 Mk, M	2	<b>508</b>	125	633	626	403	<b>457</b>	<b>508</b>	101	152	588	<b>216</b>	65	65	M20	M20	<b>140</b>	140	<b>18</b>	18	<b>69</b>	69	<b>315</b>	45	890	<b>Ø28</b>	1238	1393	Ø70	90
1(2).ZKI 315 Mk, M, Md	4,6,8											<b>90</b>	90	M24	M24	<b>170</b>	170	<b>25</b>	25	<b>95</b>	95					1268	1453			
1(2).ZKI 315 Lk, L	2	<b>560</b>	120	680	655	-	<b>560</b>	<b>630</b>	120	200	780	<b>200</b>	65	65	M20	M20	<b>140</b>	140	<b>18</b>	18	<b>69</b>	69	<b>315</b>	40	850	<b>Ø28</b>	1587	1732	Ø60	120
1(2).ZKI 315 Lk, L	4,6,8											<b>90</b>	90	M24	M24	<b>170</b>	170	<b>25</b>	25	<b>95</b>	95					1617	1792			



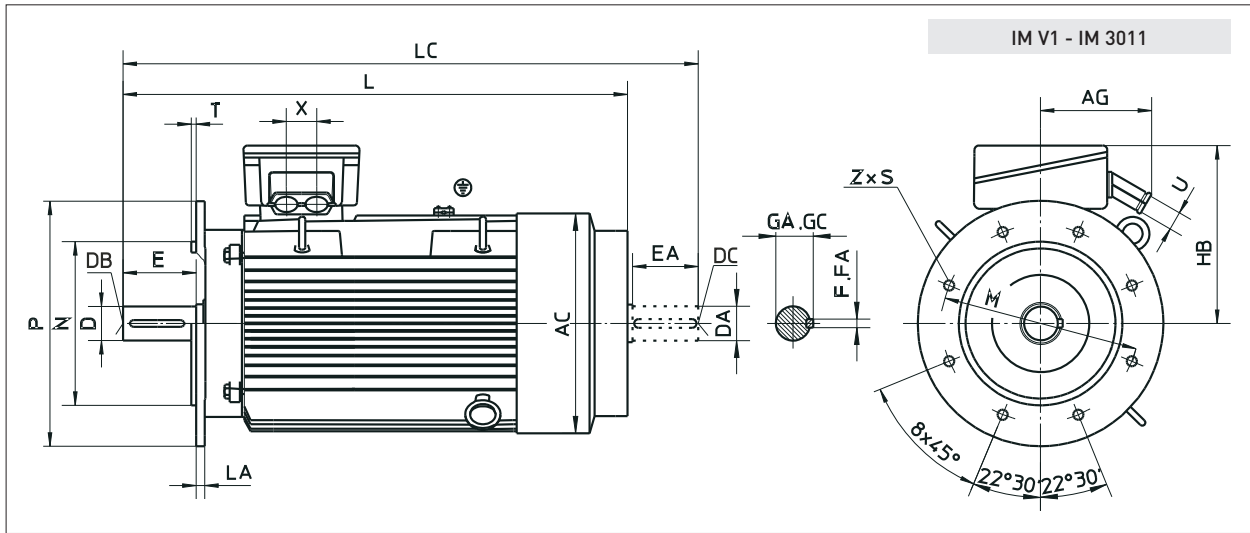
Type	Pole	Flange	A	AA	AB	AC	AG	B	BA	BA1	BB	C	H	HA	HD	K	L	LA	LC	M	N	P	S	Z	T	U	X	
1(2).ZKI 315 Mk, M	2	FF	<b>600</b>	<b>508</b>	125	633	626	403	<b>457</b>	<b>508</b>	101	152	588	<b>216</b>	<b>315</b>	45	890	<b>Ø28</b>	25	1393	600	550	660	Ø24	8	6	Ø70	90
1(2).ZKI 315 Mk, M, Md	4,6,8																			1268	1453							
1(2).ZKI 315 Lk, L	2	FF	<b>740</b>	<b>560</b>	120	680	655	-	<b>560</b>	<b>630</b>	120	200	780	<b>216</b>	<b>315</b>	40	850	<b>Ø28</b>	25	1732	740	680	800	Ø24	8	6	Ø60	120
1(2).ZKI 315 Lk, L	4,6,8																			1617	1792							

Type	Pole	D	DA	DB	DC	E	EA	F	FA	GA	GC
1(2).ZKI 315 Mk, M	2	<b>65</b>	65	M20	M20	<b>140</b>	140	<b>18</b>	18	<b>69</b>	69
1(2).ZKI 315 Mk, M, Md	4,6,8	<b>90</b>	90	M24	M24	<b>170</b>	170	<b>25</b>	25	<b>95</b>	95
1(2).ZKI 315 Lk, L	2	<b>65</b>	65	M20	M20	<b>140</b>	140	<b>18</b>	18	<b>69</b>	69
1(2).ZKI 315 Lk, L	4,6,8	<b>90</b>	90	M24	M24	<b>170</b>	170	<b>25</b>	25	<b>95</b>	95

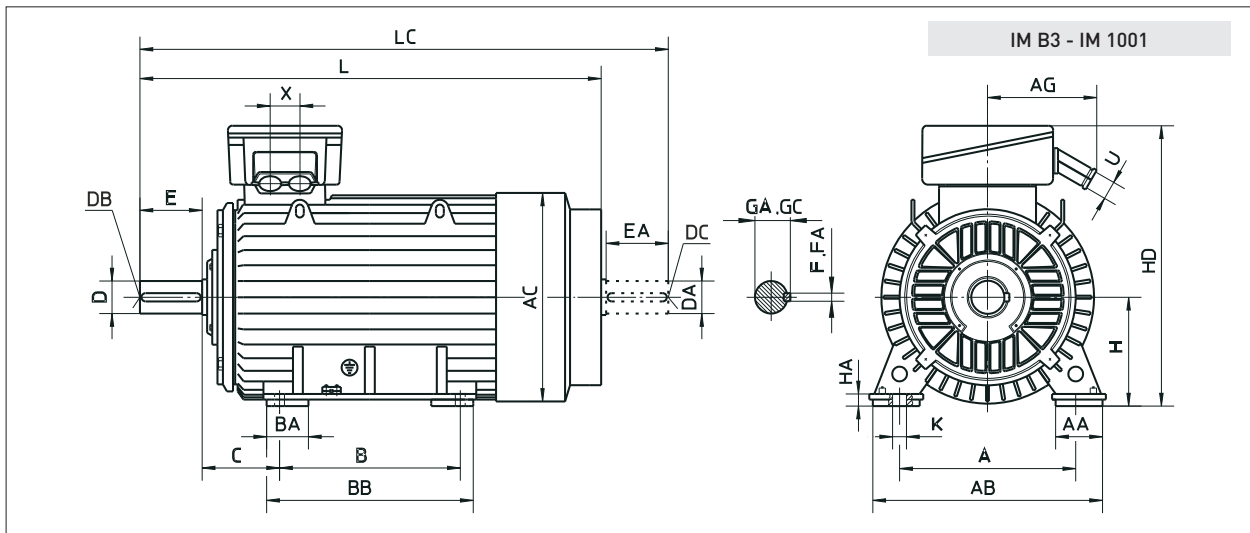
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# Low voltage three phase totally enclosed fan cooled cage motors

## Motor dimensions



Type	Pole	Flange	AC	AG	D	DA	DB	DC	E	EA	F	FA	GA	GC	HB	L	LA	LC	M	N	P	S	Z	T	U	X
1(2).ZKI 315	Mk, M	2	FF 600	626	403	<b>65</b>	65	M20	M20	<b>140</b>	140	<b>18</b>	18	<b>69</b>	69	575	1238	1393	600	550	660	Ø24	8	6	Ø70	90
	Mk, M, Md	4,6,8				<b>90</b>	90	M24	M24	<b>170</b>	170	<b>25</b>	25	<b>95</b>	95	1268	1453									
2.ZKI 315	Lk, L	2	FF 740	655	-	<b>65</b>	65	M20	M20	<b>140</b>	140	<b>18</b>	18	<b>69</b>	69	535	1587	1732	740	680	800	Ø24	8	6	Ø60	120
	Lk, L	4,6,8				<b>90</b>	90	M24	M24	<b>170</b>	170	<b>25</b>	25	<b>95</b>	95	1617	1792									

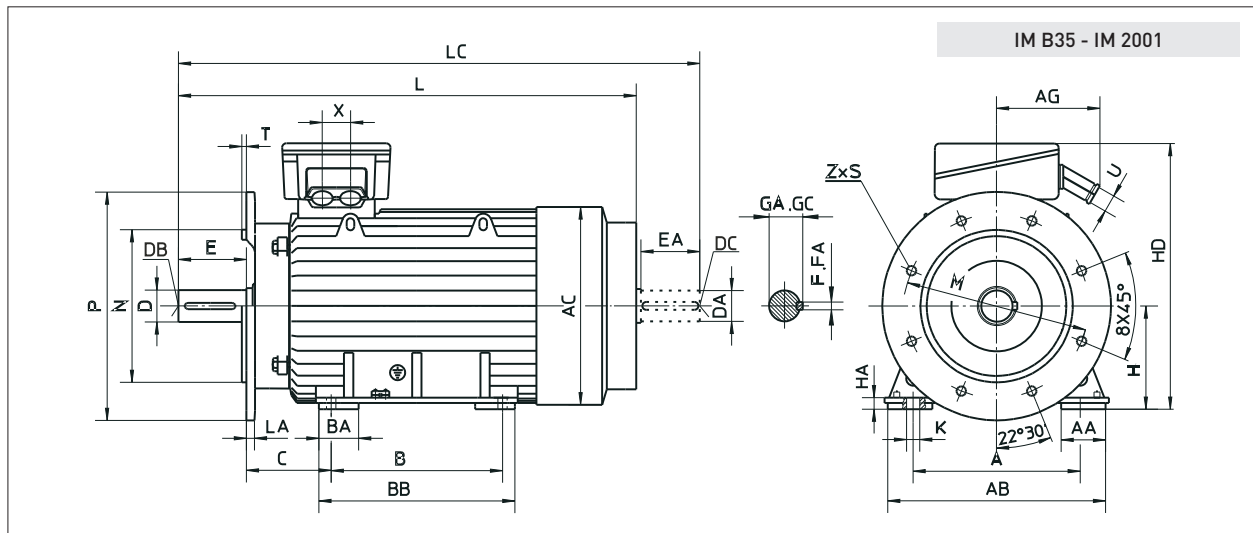


Type	Pole	A	AA	AB	AC	AG	B	BA	BB	C	D	DA	DB	DC	E	EA	F	FA	GA	GC	H	HA	HD	K	L	LC	U	X
2.ZKI 355	Mk, M, Md	<b>610</b>	140	750			<b>560</b>	140	660	<b>254</b>	<b>75</b>	75	M20	M20	<b>140</b>	140	<b>20</b>	20	<b>79.5</b>	79.5				<b>Ø28</b>	1463	1618		
	Lk, L, Ld	<b>630</b>	150	780			<b>800</b>	220	980	<b>200</b>														<b>Ø35</b>	1794	1949		
	Mk, M					713 403	<b>560</b>	140	660	<b>254</b>	<b>100</b>	100	M24	M24	<b>210</b>	210	<b>28</b>	28	<b>106</b>	106				<b>Ø28</b>	1533	1758	Ø70	90
	Md	4,6,8					<b>560</b>	140	660	<b>254</b>	<b>100</b>	100	M24	M24	<b>210</b>	210	<b>28</b>	28	<b>106</b>	106				<b>Ø28</b>	1651	1876		
	Lk, L, Ld	<b>630</b>	150	780			<b>800</b>	220	980	<b>200</b>														<b>Ø35</b>	1864	2089		

The dimensions given in bold figures are obligatory according to the recommendation of IEC. All other technical data and dimensions during the future development of motors may undergo some changes and therefore they can be considered as obligatory after our confirmation only. All dimensions are given in millimetres.

# Low voltage three phase totally enclosed fan cooled cage motors

## 12 Motor dimensions

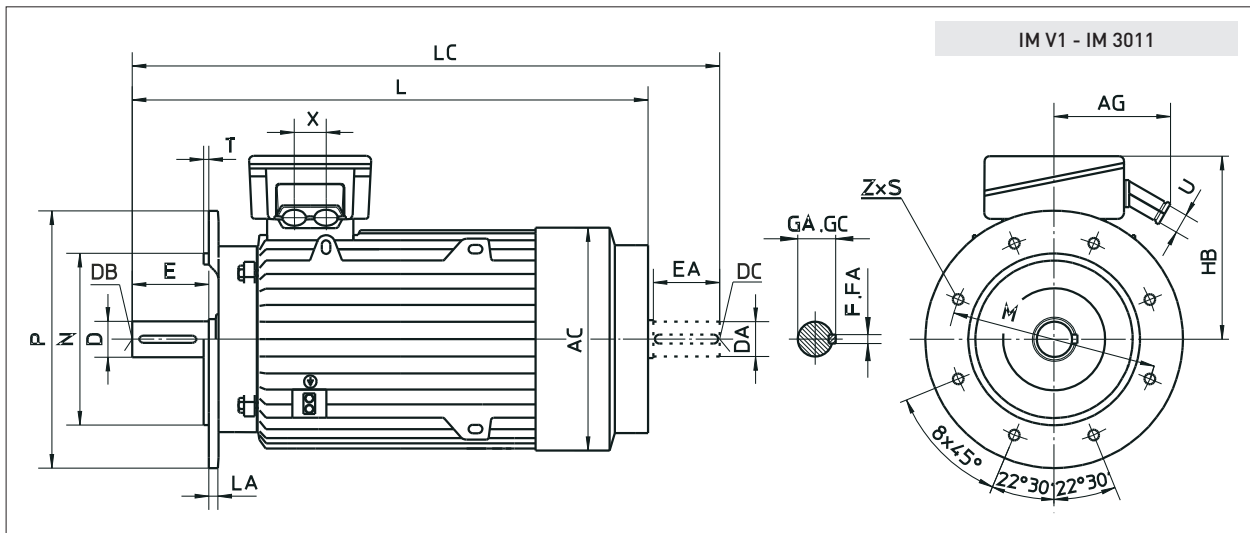


Type	Pole	Flange	A	AA	AB	AC	AG	B	BA	BB	C	H	HA	HD	K	L	LA	LC	M	N	P	S	Z	T	U	X	
2.ZKl 355	2	FF 740	Mk, M, Md	<b>610</b>	140	750		<b>560</b>	140	660	<b>254</b>					<b>Ø28</b>	1463	1618									
			Lk, L, Ld	<b>630</b>	150	780		<b>800</b>	220	980	<b>200</b>						<b>Ø35</b>	1794	1949								
2.ZKl 355	4,6,8	FF 740	Mk, M	<b>610</b>	140	750	735	403	<b>560</b>	140	660	<b>254</b>	355	35	945	<b>Ø28</b>	1533	25	1758	740	680	800	Ø24	8	6	Ø70	90
			Md	<b>610</b>	140	750	735	403	<b>560</b>	140	660	<b>254</b>					<b>Ø28</b>	1651	1876								
2.ZKl 355	4,6,8	FF 740	Lk, L, Ld	<b>630</b>	150	780			<b>800</b>	220	980	<b>200</b>				<b>Ø35</b>	1864	2089									

Type	Pole	D	DA	DB	DC	E	EA	F	FA	GA	GC	
2.ZKl 355	2	Mk, M, Md	<b>75</b>	75	M20	M20	<b>140</b>	140	<b>20</b>	20	<b>79.5</b>	79.5
		Lk, L, Ld	<b>75</b>	75	M20	M20	<b>140</b>	140	<b>20</b>	20	<b>79.5</b>	79.5
2.ZKl 355	4,6,8	Mk, M	<b>100</b>	100	M24	M24	<b>210</b>	210	<b>28</b>	28	<b>106</b>	106
		Md	<b>100</b>	100	M24	M24	<b>210</b>	210	<b>28</b>	28	<b>106</b>	106
2.ZKl 355	4,6,8	Lk, L, Ld	<b>100</b>	100	M24	M24	<b>210</b>	210	<b>28</b>	28	<b>106</b>	106

# Low voltage three phase totally enclosed fan cooled cage motors

## Motor dimensions



Type	Pole	Flange	AC	AG	D	DA	DB	DC	E	EA	F	FA	GA	GC	HB	L	LA	LC	M	N	P	S	Z	T	U	X
Mk, M, Md Lk, L	2				<b>75</b>	75	M20	M20	<b>140</b>	140	<b>20</b>	20	<b>79.5</b>	79.5		1463		1618								
2.ZKI 355 Mk, M		FF 740	735	403											590	1533	25	1758	<b>740</b>	<b>680</b>	<b>800</b>	Ø24	8	6	Ø70	90
Md Lk, L, Ld	4,6,8				<b>100</b>	100	M24	M24	<b>210</b>	210	<b>28</b>	28	<b>106</b>	106		1651		1876								
																1864		2089								

The dimensions given in bold figures are obligatory according to the recommendation of IEC. All other technical data and dimensions during the future development of motors may undergo some changes and therefore they can be considered as obligatory after our confirmation only. All dimensions are given in millimetres.

# Low voltage three phase totally enclosed fan cooled cage motors

## 14 Main characteristics

### STANDARDS AND REGULATIONS

- IEC 60034-1 Rating and performance
- IEC 60034-2 Methods for determining losses and efficiency
- IEC 60034-5 Degree of mechanical protection
- IEC 60034-6 Methods of cooling
- IEC 60034-7 Mounting arrangements
- IEC 60034-8 Terminal markings
- IEC 60034-9 Noise limits
- IEC 60034-11 Built-in thermal protection
- IEC 60034-12 Starting performances
- IEC 60034-14 Mechanical vibrations, limit values
- IEC 60034-17 Converter fed induction motors
- IEC 60038 IEC standard voltage
- IEC 60072-1 Mounting dimensions
- IEC 60085 Insulation material classification
- IEC 60721 Suitability for climate groups

The motors carry CE mark as a sign of product conformity to the requirements of all applicably directives of European Union, especially concerning safety, life and health protection, environment protection and consumer protection:

- Low Voltage Directive 73/23/EEC, modified by 93/68/EEC;
- Electromagnetic Compatibility Directive: 89/336/EEC, modified by 92/31/EEC;
- Machinery Directive 89/392/EEC modified by 91/368/EEC, 93/44/EEC and 93/68/EEC.

Quality assurance system of the SEVER motor factories is certified according to the international standard ISO 9001.

### VOLTAGE AND FREQUENCY

The motors are designed for rated supply voltage 3x400 V  $\pm 10\%$ , 50Hz according to IEC 60038. Motors up to 1.5kW are connected in star (Y) and above that in delta ( $\Delta$ ) connection. On a special request motors can be designed for other voltages and winding connections up to 690 V.

However, motors with a 50 Hz winding can be used with 60 Hz system but with appropriate variations in performance and electrical parameters.

### OUTPUT

Rated motor outputs given in the performance data tables refers to continuous running duty (S1) at rated voltage, rated frequency and maximum ambient temperature of 40°C. Motors for special operating conditions (temperature above 40°C, altitude above 1000 m ASL, frequent starting, load torque starting, driving heavy flywheel masses etc.) are available on a special request.

### SPEED

Rotation speed given in the performance data tables refers to the rated load at rated voltage and frequency. According to IEC 60034-8 the internal connection of each machine to

its own terminals is for clockwise direction of rotation from the drive side.

### MECHANICAL DESIGN AND MOUNTING ARRANGEMENTS

The main mounting motor parts and the basic materials used in design are shown in the following table:

Motor parts	Frame size														
	63	71	80	90	100	112	132	160	180	200	225	250	280	315	355
Stator frame	Aluminum alloy						Cast iron						Steel		
End shield B3	Aluminum alloy						Cast iron						Steel		
Flange B5	Cast iron												Steel		
Flange B14	Cast iron						Not available								
Feet	Cast on		Bolted			Cast on <sup>(1)</sup>					Weld.				
Fan cover	Steel										Al. alloy <sup>(2)</sup>		Steel		
Fan	Polypropylene										Al. alloy <sup>(3)</sup>		Steel		

<sup>(1)</sup> Only 1. ZKI 315 bolted, <sup>(2)</sup> Only 1. ZKI 315 steel made,

<sup>(3)</sup> Only 1. ZKI 315 steel made

The motors are designed for three basic mounting arrangements: IM B3 (IM1001), IM B5 (IM3001) and up to frame size 112 for IM B14 (IM3601). All mounting arrangements are in accordance with the IEC 60034-7.

### MECHANICAL PROTECTION

The motors are built with IP55 degree of mechanical protection meaning that they are protected against penetration of water jet and dust. The terminal box is built with the same protection degree - IP55.

### TOLERANCES

All mechanical dimensions of electrical motors are in accordance with the IEC 60072-1 which also indicates allowed tolerances.

The main mounting dimension tolerances are shown in the following table:

Term	Designation	Dimension	Tolerance
Shaft extension diameter	D, DA	≤ 28 mm	j6
		> 28 mm	k6
		> 50 mm	m6
Flange spigot diameter	N	< 450 mm	j6
		> 450 mm	h6
Flange pitch diameter	M	≤ 200 mm	± 0.25 mm
		> 200 mm	± 0.50 mm
		> 500 mm	± 1.00 mm
Foot fixing dimensions	A, B	≤ 250 mm	± 0.75 mm
		> 250 mm	± 1.00 mm
		> 500 mm	± 1.50 mm
Shaft height	H	≤ 250 mm	- 0.50 mm
		> 250 mm	- 1.00 mm



# Low voltage three phase totally enclosed fan cooled cage motors

## Main characteristics

All electrical tolerances for rated values and performance are in accordance with the IEC 60034-1, and are shown in the following table:

Term	Designation	Dimension	Tolerance
Efficiency	$\eta$	$P_N \leq 50 \text{ kW}$ $P_N > 50 \text{ kW}$	- 0.15 (1- $\eta$ ) - 0.10 (1- $\eta$ )
Power factor	$\cos\phi$		$\frac{1-\cos\phi}{6}$ Min 0.02 Max 0.07
Slip	$s$	$P_N < 1 \text{ kW}$ $P_N \geq 1 \text{ kW}$	$\pm 30 \%$ $\pm 20 \%$
Locked rotor current	$I_l$		+ 20 %
Locked rotor torque	$T_l$		- 15 % + 25 %
Break down torque	$T_b$		- 10 %
Moment of inertia	$J$		$\pm 10 \%$

### TERMINAL BOX

The motors up to frame size 112 are designed with terminal box on the top. From the frame size 132 up to 315 the motors are designed with right hand side (RHS) terminal box, left hand side (LHS) and top mounted terminal box are available on request. Motors type 1.ZKI 315 are designed with terminal box on the top - LHS or RHS position on request. 2.ZKI motors are available with top mounted terminal box only.

Terminal markings are in accordance with the IEC 60034-8. The main terminal box data are shown in the Table 2, page 17.

### ROTOR AND SHAFT EXTENSION

The rotors are cage type, normally designed with one free cylindrical shaft extension. Second shaft extension, taper shaft extension and other special shaft extensions are available on a request. The dimensions of shaft extension, key and keyway are in conformity with the IEC 60072. In order to keep load of bearings and of shaft extension within allowed limits, there must be paid attention to radial and axial forces and to the type of transmission from a motor to a working machine.

### BEARINGS

The design of the end shields and selected bearings provides quiet and long-term motor operation. The nominal bearing life of the motors with horizontal arrangements and normal conditions of use, is at least 40.000 hours. The bearings are shown in the Table 1, page 17.

### LUBRICATION

The bearings for motors up to frame size 160 are lubricated for life and regreasing is not possible. For frame sizes 180, 200 and 225 the bearings are lubricated by the motor manufacturer and cannot be relubricated without deassembling of the motor end shields. The motors from frame size 250 up to 400 are fitted with regreasing device.

The type of grease, grease quantity and regreasing time are imprinted to the rating plate. Full range data are shown in the Table 1, page 17.

### COOLING

The motors are surface cooled with self circulation. The type of cooling is IC 411, according to the IEC 60034-6. The cooling is performed by fan located on non drive side of the motor and protected by fan cover. All the motors up to frame size 200 have fans made of polypropylene. For all other frame sizes fans are made of aluminum alloy except for frame size 355 and 400 which are made of steel.

### WINDING INSULATION

The motor windings are designed with insulation in class "F". This system of insulation is suitable for temperature rise limit of 105 K but motors of this catalogue meet temperature rise requirements of the insulation in class "B" (80 K) under the normal conditions of use.

### VIBRATIONS AND BALANCING

The rotors are balanced dynamically with half key to vibration severity grade N (standard) in accordance with the IEC 60034-14. The limits of vibration severity are shown in the following table:

Grade	Limits of vibration severity in $\text{mms}^{-1}$ (effective) for frame size H in mm				
	Speed range $\text{min}^{-1}$	Free suspension			
		$56 < H \leq 132$	$132 < H \leq 225$	$255 < H \leq 400$	$H > 400$
N	$\geq 600 \leq 3600$	1.80	2.80	3.50	3.50
	$\geq 600 \leq 1800$	0.71	1.12	1.80	2.80
R	$> 1800 \leq 3600$	1.12	1.80	2.80	2.80
	$\geq 600 \leq 1800$	0.45	0.71	1.12	-
S	$> 1800 \leq 3600$	0.71	1.12	1.80	-

Vibration severity grade "R" or "S" available on a request

### OVERLOAD CAPACITY

According to the IEC 60034-1, motors can be overloaded meaning that motors heated to an operating temperature can withstand current equal to 1.5 times the rated current for not less than 2 minutes. The same way, they can be overloaded by the torque 1.6 times the rated one for 15 seconds without stalling or abrupt in speed.

### TORQUE CLASS

Motors of this catalogue and their characteristics of the starting torque are type "H", according to the IEC 60034-12. The motors are classified on the basis of torque class as follows: KR 10, KR 13 and KR 16. The motors of torque class KR 10 provide safe direct starting with torque load of 100 %, KR 13 with 130 % and KR 16 with 160 % of rated torque.

# Low voltage three phase totally enclosed fan cooled cage motors

## 16 Main characteristics

### THERMAL PROTECTION

On a special request stator winding of the motor can be protected from overheating by using PTC thermistors. In order to protect all the windings of the motor one PTC thermistor is embedded in each phase of the winding. The PTC thermistors are connected in series and two ends of such connection are led out in the terminal box. These two ends have to be connected to the control unit. Besides, the motors can be equipped with additional thermistors for alarm.

### HEATERS

As a protection against condensed water the motors can be equipped with heaters. During the motor stand still the heaters must be switched on. The power and supply voltage of the heating elements are shown in the following table:

Frame size H, mm	Supply voltage V	Heater's power P <sub>g</sub> , W
71-80	115 ili 230	8
90-112		25
132-160		40
180-250		80
280-315		130
355		200
400		280

### NOISE

The motors satisfy the noise level emission in accordance with the IEC 60034-9. The noise levels shown in the following table refer to a no load motor, 400 V, 50 Hz, cooling type IC 411 and protection IP55. Tolerance is + 3dB (A).

Noise levels dB (A)	Frame size															
	63	71	80	90	100	112	132	160	180	200	225	250	280	315	355	
2 pole	L <sub>pfA</sub> <sup>(1)</sup>	45	58	62	65	71	73	78	80	78	85	82	75	84	85	85
	L <sub>wA</sub> <sup>(2)</sup>	56	69	73	77	83	85	90	94	92	98	96	89	98	99	99
4 pole	L <sub>pfA</sub>	42	41	50	52	55	60	62	65	73	71	74	77	79	84	85
	L <sub>wA</sub>	53	52	61	64	67	72	74	78	87	84	88	92	94	98	99
6 pole	L <sub>pfA</sub>	-	39	46	51	59	58	71	66	61	67	72	69	68	75	85
	L <sub>wA</sub>	-	50	57	63	71	70	83	78	75	81	86	83	82	89	99
8 pole	L <sub>pfA</sub>	-	37	45	51	52	55	57	62	64	64	71	63	61	80	82
	L <sub>wA</sub>	-	48	56	63	64	67	69	74	77	77	86	75	74	94	96

<sup>(1)</sup> - L<sub>pfA</sub> - Sound pressure, <sup>(2)</sup> - L<sub>wA</sub> - Sound power

### CONVERTER FED MOTORS

The motors are suitable for operation by electronic converters since the winding insulation of the motors endures certain voltage overloading. Generally, motors operated by converters have higher level of losses, vibrations and noise. So, during the motor operation performed from converter it is necessary to de-rate the motor, depending on speed range, torque-speed characteristics of the load, type of cooling and type of converter. Therefore when placing an order note that the motor will be operated by converter.

### FINISH PAINTING

Standard finish painting of the motors is performed by protective alkyd paint (RAL 5010). For special climate conditions, according to IEC 60721-2-1, painting is performed by epoxy paint.

### PACKING

The motors of frame size 63 up to 132 are packed in individual cardboard boxes while the motors of frames 160 and bigger are packed in wooden crates.

In order to prevent damaging of the bearings during the motor transportation and from excessive vibrations during the motor stand still, the motors of frame size 160-400 are equipped with special rotor blocking system.

### QUESTIONNAIRE

Please, answer the questions from the attached questionnaire as fully as possible, to enable offering motors which will satisfy your requirements the best.

# Low voltage three phase totally enclosed fan cooled cage motors

## Table of Bearings and Terminal box

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TABLE 1. - BEARINGS

Motor type	Drive end	Opposite end		Grease Insulation class		Grease quantity		Regreasing period, h				
		Horizontal design	Vertical design	B, F	H	g	cm <sup>3</sup>	Number of poles				
								2	4	6	8,10,12	
1.ZK 63	6002 2Z C3	6002 2Z C3										
1.ZK 71	6203 2Z C3	6203 2Z C3										
1.ZK 80	6204 2Z C3	6204 2Z C3										
1.ZK 90	6205 2Z C3	6205 2Z C3										
2.ZK 100	6206 2Z C3	6206 2Z C3						For life lubricated				
2.ZK 112	6206 2Z C3	6206 2Z C3										
1.ZK 132 M, S	6208 2Z C3	6208 2Z C3										
1.ZK 160 M, L	6210 2Z C3	6210 2Z C3										
1.ZK 180 M, L	6310 C3	6310 C3						11500				
1.ZK 200 L	6312 C3	6312 C3				Without regreasing device		10000	20000			
1.ZK 225 M, S	6313 C3	6313 C3										
1.ZK 250 M	6314 C3	6314 C3				27	34	2000	5400	7400	8500	
1.ZK 280 M, S	2p=2 6216 C3	6216 C3						2000	-	-	-	
	2p=4,6,8 NU 216	6216 C3				19	24	-	2000/ 5400	3900/ 7400	5300/ 8500	
1.ZK 315 M, S	2p=2 6217 C3	6217 C3						1800	-	-	-	
	2p=4,6,8 NU 217	6217 C3				22	28	-	1800/ 5000	3600/ 7000	5000/ 8300	
1.ZKI 315 M	2p=2 6317 C3	6317 C3	6317 C3	7317 B	Lithium based grease	37	46	1400	4400	6500	7800	
	2p=4,6,8 6319 C3	6319 C3	6319 C3	7319 B		45	56	-	3900	5900	7200	
2.ZKI 355 M, L	2p=2 6317 C3	6317 C3	6317 C3	7317 B		37	46	1400	-	-	-	
	2p=4,6,8 6322 C3	6322 C3	6322 C3	7322 B		60	75	-	3100	5000	6500	
2.ZKI 400 L	2p=2 6319 C3	6319 C3	6319 C3	7319 B		45	56	1100	-	-	-	
	2p=4,6,8 6324 C3	6322 C3	7322 B			72/ 60	90/ 75	-	2700/ 3100	4700/ 5000	6100/ 6500	

Table 2. - Terminal box

Motor type	Number of terminals	Terminal stud thread	Maximal permissible current, A	Number of entries	Dimension of entries	Max. cable diameter mm	Terminal box position							
1.ZK 63	6 <sup>[1]</sup>	M4	16	2	M20 x 1.5	13	Top mounted only							
1.ZK 71							Top mounted <sup>[2]</sup>							
1.ZK 80														
1.ZK 90														
2.ZK 100														
2.ZK 112														
1.ZK 132								M5	25	M32 x 1.5	21			
1.ZK 160														
1.ZK 180														
1.ZK 200														
1.ZK 225														
1.ZK 250														
1.ZK 280	M6	63	M40 x 1.5	28	Right hand side (left hand side and top position on request)									
1.ZK 315														
1.(2.)ZKI 315 Mk, M, Md														
2.ZKI 315 Lk, L														
2.ZKI 355 Mk, M						M8	100	M50 x 1.5	35					
2.ZKI 355 Md														
2.ZKI 355 Lk, L, Ld														
2.ZKI 400														
										M10	160	M63 x 1.5	48	
	M12	250	M63 x 1.5	56*	Top mounted <sup>[2]</sup>									
						M16	315	M75 x 1,5	58*					
										M16	315	M75 x 1,5	58*	
	M20	630	M75 x 1,5	58*	Top mounted only									
						12	M16	730	M80 x 2					64*
										4	M80 x 2	64*		

Note: <sup>[1]</sup> - 12 terminals available on a request., <sup>[2]</sup> - Right or left hand side on a request.

\* - Cable Glands - metallic, Terminal box with front plate for entries

# Low voltage three phase totally enclosed fan cooled cage motors

## 18 QUESTIONNAIRE FOR THE OFFER OF ASYNCHRONOUS ELECTRIC MOTORS



Enquiry Number: \_\_\_\_\_

Customer: \_\_\_\_\_ ITEM: \_\_\_\_\_  
Qty: \_\_\_\_\_

**A MOTOR DATA**

1 Motor type: Three phase: \_\_\_\_\_ Single phase: \_\_\_\_\_

2 Rotor type: Squirrel cage: \_\_\_\_\_ Slip-ring: \_\_\_\_\_

3 Rated output:  $P_N =$  \_\_\_\_\_ kW

4 Rated voltage:  $U_N =$  \_\_\_\_\_ V Connect: Star \_\_\_\_\_ Delta \_\_\_\_\_

5 Rated frequency:  $f_N =$  \_\_\_\_\_ Hz

6 Rated speed:  $n_N =$  \_\_\_\_\_ rpm

7 Insulation class: F  B

8 Duty type: S1  S2  S3  S4  S5  S6  S7  S8  S9  S10   
ED % \_\_\_\_\_ starts/h \_\_\_\_\_ min  $J_{mot}$  \_\_\_\_\_ kgm<sup>2</sup>

9 Standard: \_\_\_\_\_ IEC or \_\_\_\_\_

10 Cooling method: \_\_\_\_\_ IC \_\_\_\_\_

11 Mounting arrangement: IM \_\_\_\_\_

12 Protection degree: Motor IP: \_\_\_\_\_ Terminal box IP: \_\_\_\_\_

13 \*Sense of rotation: Left \_\_\_\_\_ Right \_\_\_\_\_ Both \_\_\_\_\_

14 Motor brake: yes  no   
Braking moment: \_\_\_\_\_ Nm  
Brake voltage: \_\_\_\_\_ V/Hz \_\_\_\_\_ V,DC \_\_\_\_\_

15 No-load regime? (single phase motor) yes \_\_\_\_\_ no \_\_\_\_\_

16 Rotor data:  $U_{2c} =$  \_\_\_\_\_ V  $I_{2n} =$  \_\_\_\_\_ A

**B DATA ABOUT THE DRIVEN MACHINE**

1 Type: \_\_\_\_\_

2 Required power: \_\_\_\_\_

3 Required speed: \_\_\_\_\_

4 Load torque characteristic:  
Constant \_\_\_\_\_ Squared \_\_\_\_\_ or \_\_\_\_\_  
Speed %: 0  25  50  75  100   
Torque Nm: \_\_\_\_\_

5 Moment of inertia:  $J =$  \_\_\_\_\_ kgm<sup>2</sup>

6 Running machine special data: \_\_\_\_\_

**C AMBIENT CONDITIONS**

1 Ambient temperature: \_\_\_\_\_ C

2 Relative humidity: \_\_\_\_\_ %

3 Altitude (above sea level): \_\_\_\_\_ m

4 Specific ambient conditions: \_\_\_\_\_

**D POWER TRANSMISSION AND STARTING CONDITIONS**

1 Coupling type: \_\_\_\_\_

2 Starting: \_\_\_\_\_

3 Number of consecutive startings:  
Hot state: \_\_\_\_\_ per hour \_\_\_\_\_ per day  
Cold state: \_\_\_\_\_ per hour \_\_\_\_\_ per day

**E ADDITIONAL REQUESTS FOR MOTOR EXECUTION**

1 Overloading from: \_\_\_\_\_ %  $P_N$   
Duration: \_\_\_\_\_ min

2 Temperature rise: F  B

3 Request for: vibration level \_\_\_\_\_ mm/s  
noise level \_\_\_\_\_ db

4 \*Terminal box position:  
left  right  On top

5 Additional shaft loading sense  
axial force \_\_\_\_\_ radial force \_\_\_\_\_

6 Converter feed operation: yes  no   
Converter type: \_\_\_\_\_  
Manufacturer: \_\_\_\_\_  
Speed range: from \_\_\_\_\_ to \_\_\_\_\_ rpm

7 Sensor category (mark in lower field):  
Tacho gen. \_\_\_\_\_ Encoder \_\_\_\_\_ Absolute \_\_\_\_\_ Resolver \_\_\_\_\_  
Sensor Type: \_\_\_\_\_

8 Flange size: \_\_\_\_\_ mm

9 Second shaft end: yes  no   
DA= \_\_\_\_\_ mm EA= \_\_\_\_\_ mm

10 Other requests and limits: \_\_\_\_\_

**F ADDITIONAL EQUIPMENT, SPARE PARTS AND DOCUMENTATION**

1 Thermal protection: yes  no   
Type: \_\_\_\_\_

2 Bearings thermometers yes  no

3 Anti-condensation heaters yes  no

4 Spare parts yes  no

5 Guarantee sheet yes  no

6 Language of instruction list: \_\_\_\_\_

7 Other requests for packing: \_\_\_\_\_

**H CUSTOMER**

1 Company: \_\_\_\_\_

2 Address: \_\_\_\_\_

3 City: \_\_\_\_\_

4 Country: \_\_\_\_\_

5 Person: \_\_\_\_\_

6 Telefon / Telefax: \_\_\_\_\_

7 e-mail: \_\_\_\_\_

You are kindly requested to provide us with as much data as possible thus enabling us to offer satisfactorily

\* OBSERVED FROM DRIVE END

Notes:

**ATB Group - a global player**

a company of **A-TEC INDUSTRIES AG**



**SCHORCH**

**BROOK  
CROMPTON**



**Tamel S.A.**

## Company locations

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