

Technical Documentation

FAMCO
هایپر صنعت



ELECTRIC MOTORS IN EXPLOSION - PROOF
PROTECTION INCREASED SAFETY EExe
FLAMEPROOF ENCLOSURE EExd

EX09EN



ATB SEVER
Technology in Motion



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



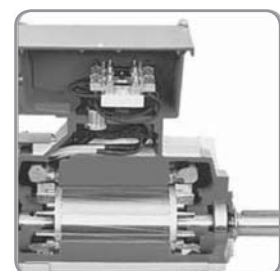
Serial Motors



New Businesses



Home Appliances



Project Motors

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1. GENERAL INFORMATION

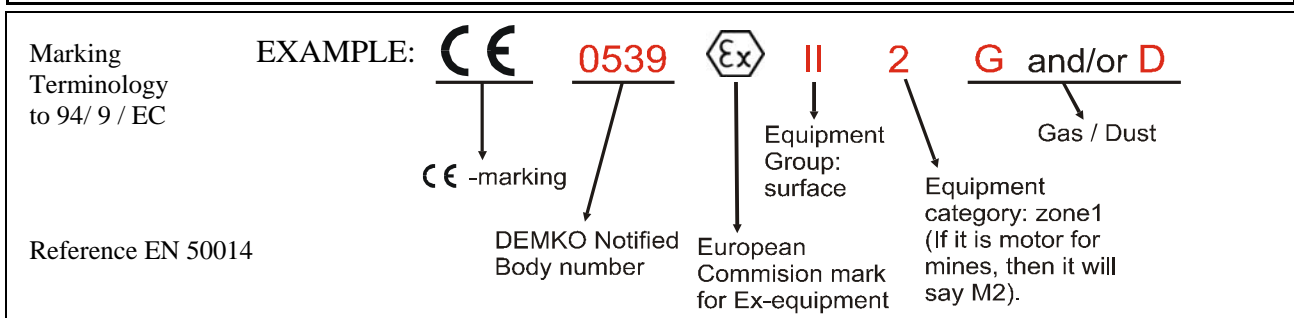
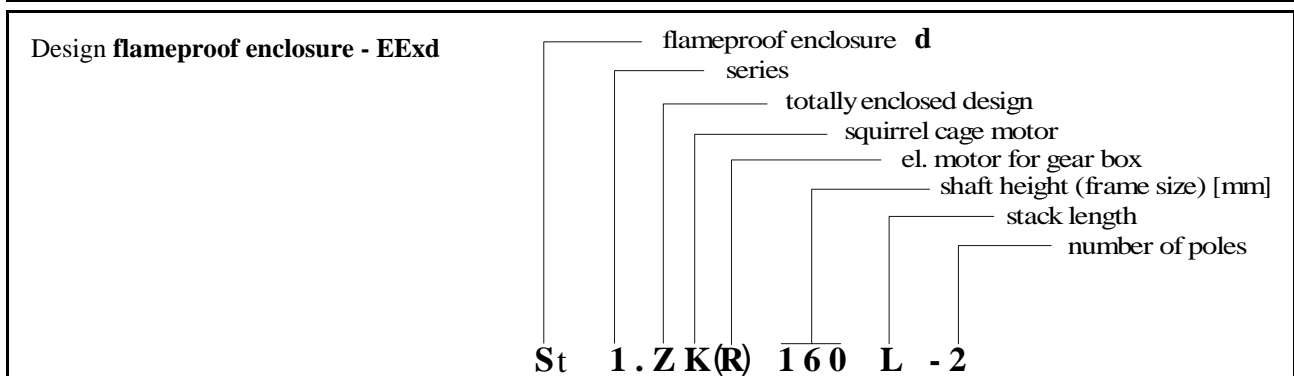
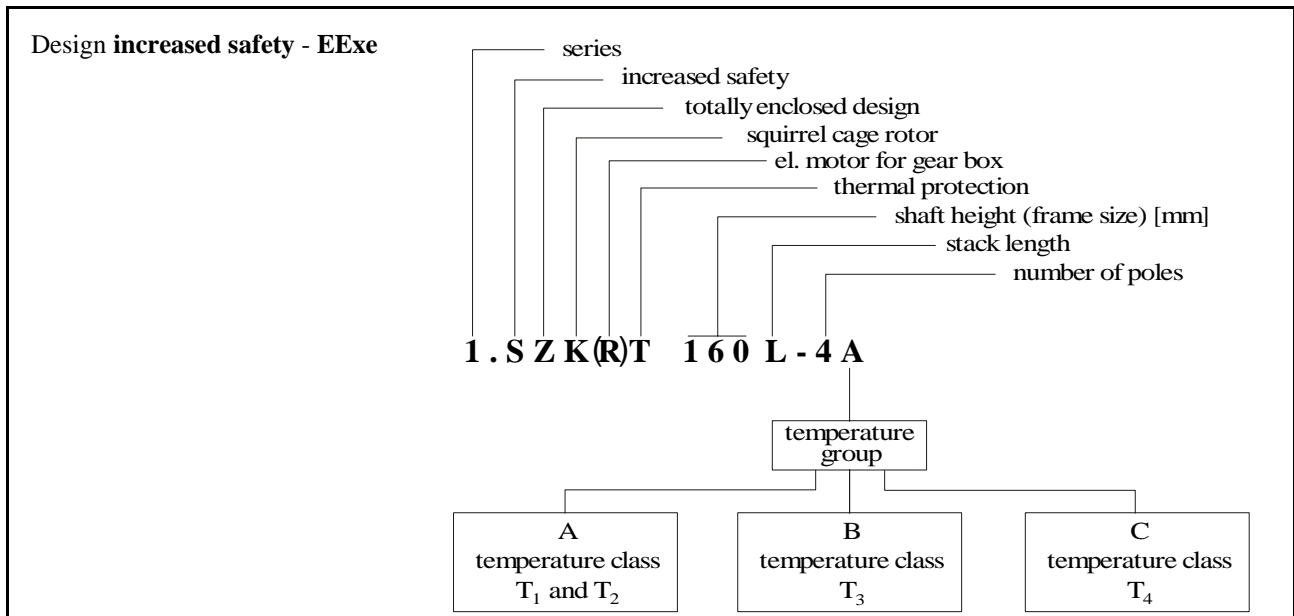
1.1 INTRODUCTION

Explosion-proof three-phase induction electric motors in this catalogue, refer to the design of increased safety - **EExe** and flameproof enclosure - **EExd**. These motors are applied in industrial plants, in which danger can occur from explosion of inflammable vapours or gases (e.g. chemical industry, petrochemical industry, oil refinery, textile industry) and also in mines, which are dangerous because of methane and inflammable dust.

Design **increased safety is in conformity with standards** EN 50014 and EN 50019 while the design **flameproof enclosure** is in conformity with EN 50014 and EN 50018.

1.2 DESIGNATION OF DESIGN

Designation of electric motors manufactured by ATB SEVER according to the mentioned designs is done as follows:



1.3 STANDARDS AND DIRECTIVES

1.3.1 Review of basic standards and directives



	International referent standards		National standards		
	IEC International Electrotechnical Commission	EN-CENELEC European committee for el. tech.norms.	DIN/VDE- German industry norms- Association of German electric technicians	BS- British standards	CEI- Electrotechnical committee of Italy
Rotating electrical machines	IEC 60034, part 1 IEC 60085	EN 60034-1	DIN EN 60034-1/ VDE 0530, part 1	BS 4999: P1 BS 4999: P69	CEI 2-3355
Methods for determining losses and efficiency	IEC 60034, part 2	EN 60034-2	DIN EN 60034-2/ VDE 0530, part 2	BS 4999-34	CEI2 -6
Degree of mechanical protection	IEC 60034, part 5	EN 60034-5	DIN EN 60034-5/ VDE 0530, part 5	BS 4999: P20	CEI 70-1519
Methods of cooling	IEC 60034, part 6	EN 60034-6	DIN EN 60034-6/ VDE 0530, part 5	BS 4999: P21	CEI 2/No-454
Mounting arrangements	IEC 60034, part 7	EN 60034-7	DIN EN 60034-7/ VDE 0530, part 5	BS 4999: P22	CEI-UNEL 05513
Terminal markings	IEC 60034, part 8	EN 60034-8	DIN/VDE 0530, part 8	BS 4999: P23	CEI 2-8V1 No 5628
Noise limits values	IEC 60034, part 9	EN 60034-9	DIN EN 60034-9/ VDE 0530, part 9	BS 4999: P51	Draft of Italian standard P288
Starting performances	IEC 60034, part 12	EN 60034-12	DIN/VDE 0530, part 12	—	—
Mechanical vibrations, limit values	IEC 60034, part 14	EN 60034-14	DIN/VDE 0530, part 14 DIN ISO 2373	BS 4999: P50	Draft of Italian standard P288
Mounting dimensions	IEC 60072	EN 60072	DIN 42673, part 3	BS 4999: P10	CEI-UNEL 13117
Electrical apparatus for explosive gas atmospheres - General provisions	IEC 60079, part 0	EN 50014	DIN EN 50014	BS 5501: P1	CEI 31-8459
Electrical apparatus for explosive gas atmospheres - Flame-proof enclosure EExd	IEC 60079, part 1	EN 50018	DIN EN 50018/ VDE 0171, part 5	BS 5501: P5	CEI 31-1472
Electrical apparatus for explosive gas atmospheres - increased safety EExe	IEC 60079, part 7	EN 50019	DIN EN 50019/ VDE 0171/ part 6	BS 5501: P6	—

The explosion-proof protection motors covered by the new Directive 94/9/EC must also meet the requirements of other relevant Directives: Low Voltage Directive 73/23/EEC, modified by 93/68/EEC; Electromagnetic Compatibility Directive 89/336/EEC, modified by 92/31/EEC and 93/68/EEC and Machinery Directive 98/37/EC.

1.3.2 Release, hazardous areas and zones

The source of release is the place which contains inflammable medium or from which the inflammable medium goes out. Inflammable medium is considered to be, as follows:

- ◆ the explosive mixture of gases, vapours and dust,
- ◆ medium-air mixture can make explosive atmosphere.

Regarding the way of formation and duration of explosive mixtures, sources of release are classified as permanent, primary and secondary sources of release.

Permanent sources of release contain or emit permanently inflammable medium or explosive mixture into the surrounding space.

Primary sources of release, occasionally, at normal operation, contain or emit inflammable medium or mixture into the surrounding space.

Secondary sources of release, only under abnormal circumstances, i.e. in case of damage of the plant or incorrect technological process, emit inflammable medium or mixture into the surrounding space.

The sources of release can be multi-stage, and in determining hazardous area every stage will be taken into consideration separately.

The hazardous area is the space in which explosive atmosphere is present or can be expected. Its presence in the certain quantity requires special measures of precaution, with regard to assembly performance and use of electric devices, tools, machines and accessories which sparks, make electric arc or have heated surfaces.

Classification by group and category for mining and surface industry is defined according corresponding Standards and Directives.

1.3.3 Temperature classes and groups of gases

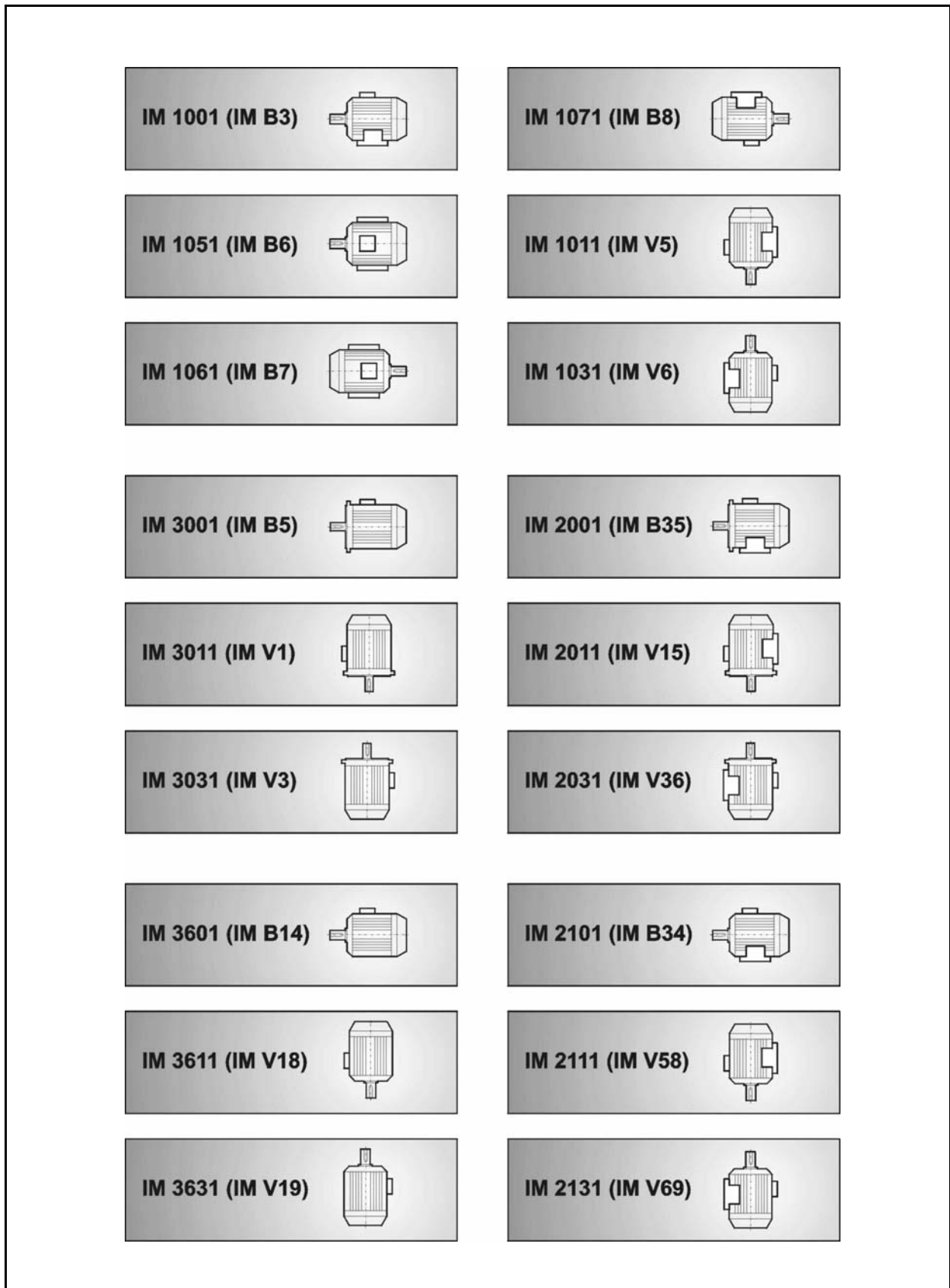
In order to occur explosions the existing mixture must be ignited initially. For initial ignition its source must have enough power and temperature above the minimum temperature of ignition of this mixture. Gases and vapours are classified in the following temperature classes, on the basis of ignition temperature measured by a method and with a device in accordance with the corresponding standard.

Temperature class	Max. surface temperature
T1	450 °C
T2	300 °C
T3	200 °C
T4	135 °C
T5	100 °C
T6	85 °C

This standard provides data of group of gases, temperature classes, max. experimental safety gap, ignition temperature and ratio of minimal ignition current and minimal ignition current of laboratory methane, for 156 gases and vapours, which can form explosive mixtures. The most hazardous gases are: acetylene, hydrogen, carbon disulfide, are in the group C; ethylene, methyl acrylate, dimethyl ethane and some other gases are in the group B; while most of them are in the group A (methane, ethane, amyl-acetone, ammonia, benzol, butane, propane and masout).

1.4 MECHANICAL CHARACTERISTICS

1.4.1 Mounting arrangements of electric motors



1.4.2 Shaft extension

Motors are manufactured with one cylindrical shaft extension. On a special request, they can be manufactured also with two shaft extensions, with a tape shaft extension and with other special forms. The dimensions of shaft extension, keys and keyway dimensions are in conformity with the IEC 60072-1. The dimensions of tapped hole in shaft are shown in the following table. In order to keep load of bearings and of shaft extension within the 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.

Tapped hole in shaft

Frame size	Drive side	Fan side
71	M5	M4
80	M6	M5
90	M8	M8
100	M10	M10
112		
132	M12	M12
160	M16	M16
180		
200	M20	M20
225		
250		
280		
315		

1.4.3 Balancing and vibrations

All motors are balanced dynamically with half key on a drive shaft extension in quality which corresponds to DIN ISO 2373. Measurement evaluation and limits of vibration are according to IEC 60034 part 14. The data are shown in the following table. Motors with vibration degree "R" (reduced) or "S" (special) are available on a special request.

Indicated speed [mms ⁻¹]	Max. effective value of vibration speed for shaft height H [mm]			
	Machines measured in a state of free suspension			Rigid mounted
	56 ≤ H ≤ 132 [mm/s]	132 < H ≤ 225 [mm/s]	H > 225 [mm/s]	H > 400 [mm/s]
≥ 600 ≤ 1800	1,8	1,8	2,8	2,8
> 1800 ≤ 3600	1,8	2,8	4,5	2,8

1.4.4 Noise

Motors satisfy the noise level emission in accordance to standard IEC 60034, Part 9.

1.4.5 Surface protection

Final surface protection of motor is performed by alkyd color, type RAL 7001. Motors for exploitation in special atmospheric conditions according to IEC 529 (EN 60529) are available on a special request.

1.4.6 Rating plates

Rated and inspection data are in the same rating plate fixed on the enclosure. A duplicate of the plate is located in the cover of the terminal box. The plates are made of stainless steel.

1.5 ELECTRICAL CHARACTERISTICS

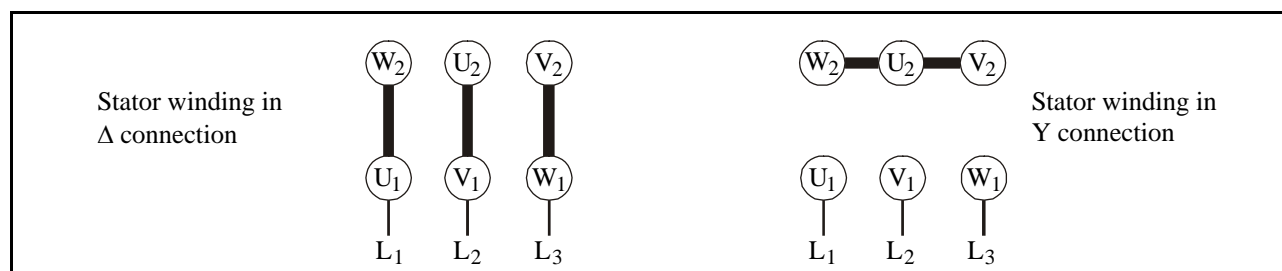
1.5.1 Voltage and frequency

Motors are designed for rated voltage 400 V ±10%, 50 Hz according to IEC 60038. Motors up to 1,5 kW are connected in star (Y), and above that in delta (Δ). On a special request motors can be designed for other voltages as well, as it is shown in the following table, up to 690 V and for frequency from 42 to 60 Hz.

Voltage [V]	Frequency [Hz]
380	50
400	
415	
500	
440	60
460	
480	

1.5.2 Terminals and winding connection

Motors are manufactured with six winding terminals which are marked as: U1, V1, W1, U2, V2, and W2. Stator winding are made in connection star (Y) for motors up to 1.5 kW and delta (Δ) for other motors. Motors in delta connection need special measures for motor protection.



Two-speed motors with a speed ratio 2:1 are made with Dahlander windings, while the motors with a pole ratio 4/6 or 8/6 are made with two separate stator windings in star connection.

1.5.3 Output

The rated motor outputs, given in selection tables are for continuous running duty. This means that motors have to be connected to the network of rated voltage and frequency, while ambient temperature must not exceed 40 °C and the altitude must be up to 1000 m.

1.5.4 Overloading and starting

According to 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 change in speed.

Overcurrent relays, which must be applied in conformity with the regulations for hazardous areas, allow limited starting time. This means that flywheel masses, which accelerate during start, are also limited.

1.5.5 Insulation and heating

Windings are designed with insulation of thermal class F. A motor temperature rise satisfies both thermal class B, which is 80 K over the maximum ambient temperature of 40°C, and temperature class T4.

1.5.6 Inverter fed motors

Motors are suitable for operation by frequency inverter since the winding insulation of the motors endures certain voltage overloading. Generally, motors operated by inverters have higher noise level. During operation by inverter, the motors have additional load losses, which affect the output torque, depending on a speed ratio, characteristics of working machine, type of cooling (self-ventilated or an additional, external fan) and on the type of inverter, as well. Therefore when placing an order it is necessary to note that the motor will be operated by inverter. It is also necessary to define the speed ratio and characteristics of the working machine $P=f(n)$ or $M=f(n)$.

2. MOTORS IN PROTECTION OF INCREASED SAFETY EExe

2.1 EXPLOSION-PROOF PROTECTION OF INCREASED SAFETY EExe

Concerning electric motors in explosion-proof protection of increased safety "EExe" there have been taken measures, which prevent occurrence of sparking, electric arcs or excessive temperatures during operation of machine.

2.2 DESIGN, TAKEOVER AND APPLICATION OF MOTORS IN PROTECTION EExe

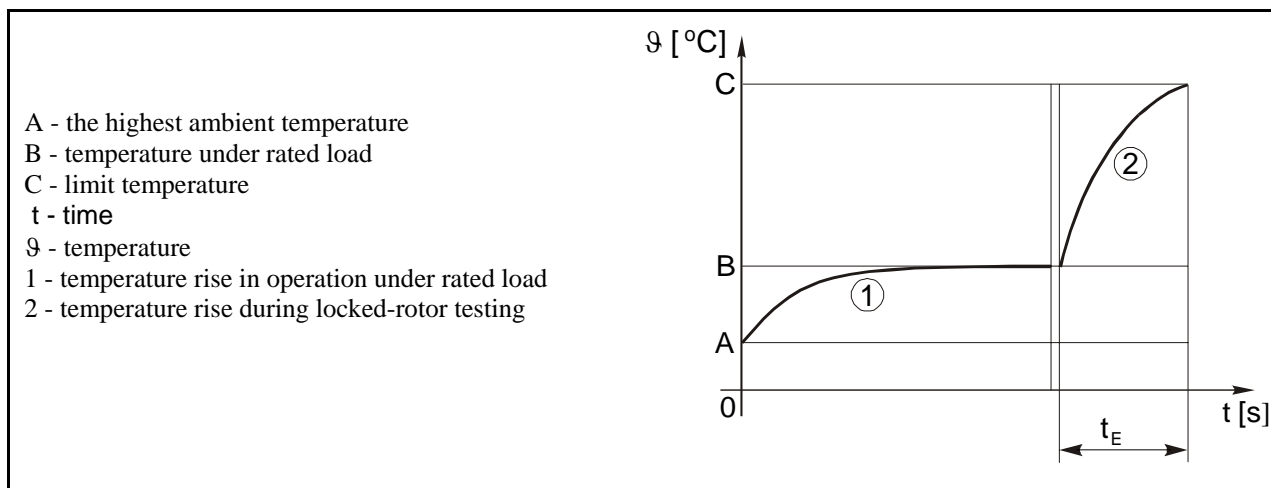
2.2.1 Design

Electric motors are in an enclosure which protects against penetration of dust, particles and other impurities. Besides the enclosure, protection is consisted of:

- ◆ good insulating material (non-hygroscopic, thermostable, mechanically strong, non-flammable, self-extinguishing and resistant to leakage currents)
- ◆ good mechanical protection (terminal box IP54, enclosure IP44)
- ◆ allowed heating in the limits of temperature class T1 - T4; insulation class F (H class on a special request)
- ◆ winding impregnation (vacuum system and submerging)
- ◆ expert supervision and handling

2.2.2 Overload protection

Basic protection against overloading is an overcurrent protecting device (e.g. a motor protection switch). Besides current control in normal operation in case of locked rotor, the protection device also has to disconnect a motor within time t_E , which is given in a rating plate of the motor. Triggering characteristics of a trigger or of a relay with thermal tensioning are based on the initial temperature of 20°C. The applied protecting device (trigger or relay) must have a suitable characteristics – current ratio/time, which provides time of disconnection in the function of the motor current ratio – I_p/I_N . In addition, the protection device must have the possibility of connecting / disconnecting currents higher than the locked-rotor current I_p . The current dependant protecting devices are effective only with continuous (non-intermittent) duty and normal starting conditions, which do not cause overheating. For difficult starting conditions and for intermittent duties, the special protecting devices must provide that limit temperatures are never exceeded (during starting, too). It is



considered that there are difficult starting conditions, if a motor protecting device disconnects the motor before it reaches its rated speed. The t_E time taken for windings, when carrying the locked-rotor current I_p , to be heated up from the temperature reached in rated operation and at maximum ambient temperature to the limiting temperature. The t_E time is never less than 5 seconds. Appropriate protecting device to disconnect the motor within the t_E time is essential.

In case of difficult starting conditions, either motors of special design or double-stage overcurrent protection in combination with a relay for automatic control of speed and starting time are being used. Devices for direct control of winding temperature with sensors placed in the winding (e.g. PTC sensors) can also be applied,

but performance of such protection must be proved by testing together with a motor for all duty conditions (starting, continuous operation, disturbances, locked rotor). This is indicated in a suitable way.

In case of intermittent duty, heating is supervised by continuous secondary protection with two, three or more time constants, depending on the motor output.

2.2.3 Application

The motors can be applied in hazardous areas, where explosive atmosphere, such as mixtures of gases, fumes or vapour occur occasionally, but in accordance with temperature class rated in a motor rating plate. Valid technical regulations, which determine the installation of motor in hazardous areas, are to be paid attention.

2.2.4 Technical acceptance and certification

Technical acceptance and certification of motor in explosion-proof protection is performed according to defined procedures of authorized institutions and low regulations. ATB SEVER has certified its products both in the Yugoslav authorized institution - FEDERAL INSTITUTION for STANDARDIZATION, Belgrade, and in Danish authorized institution DEMCO, Denmark.

2.3 MECHANICAL DESIGN

2.3.1 Mechanical protection

Motors are designed in mechanical protection IP55 (IEC 60034-5 and EN 60034-5).

2.3.2 Tabular review of constructional materials

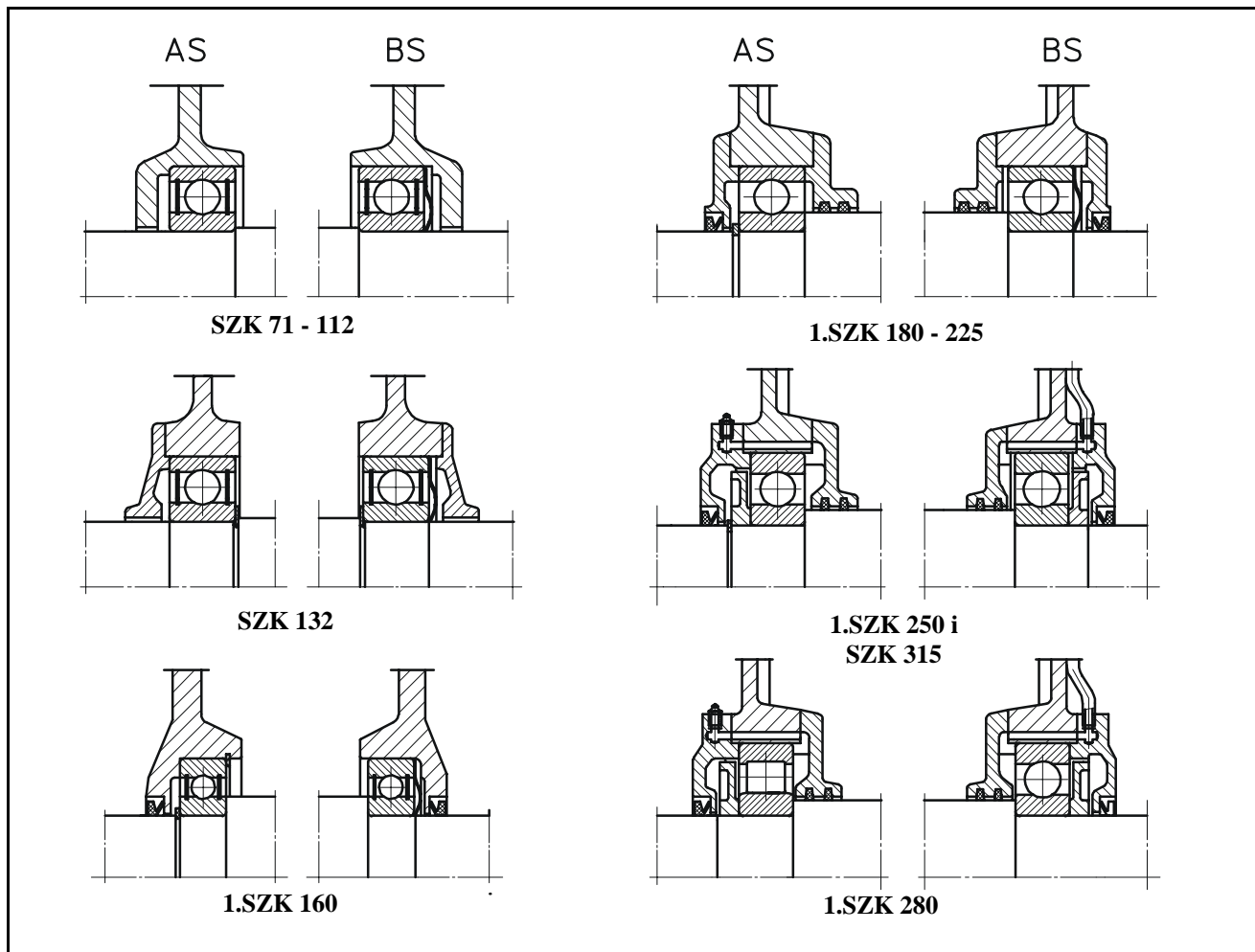
Frame size	Constructional elements of electric motor							
	Stator frame	Feet	Stator cover	Fan cover	Fan for both way rotation		Terminal box	
					2p=2	2p=4,6,8		
71	Aluminium alloy			steel			together with frame	
80								
90								
100								
112								
132	cast iron						Aluminium alloy	
160								
180								
200								
225								
250								Aluminium alloy
280								
315								

2.3.3 Bearing arrangement

The technical solution of bearing arrangement provides even and long-term operation of a motor. Characteristics and dimensions of bearings are shown in the Table 1. on page 10.

Table 1. - Bearings

Type	Drive end	Opposite end		Grease for re-lubrication		Amount of grease		Time of re-lubrication [h]					
				Insulation class				Number of poles					
		Horizontal design	Vertical design	B, F	H	[g]	[cm ³]	2	4	6	8,10,12		
1.SZK 63	6002 2Z C3	6002 2Z C3						For life lubricated					
1.SZK 71	6203 2Z C3	6203 2Z C3											
1.SZK 80	6204 2Z C3	6204 2Z C3											
1.SZK 90	6205 2Z C3	6205 2Z C3											
2.SZK 100	6206 2Z C3	6206 2Z C3											
2.SZK 112	6206 2Z C3	6206 2Z C3											
1.SZK 132 M, L	6208 2Z C3	6208 2Z C3											
1.SZK 160 M, L	6210 2Z C3	6210 2Z C3											
1.SZK 180 M, L	6310 C3	6310 C3											
1.SZK 200 L	6312 C3	6312 C3											
1.SZK 225 M, S	6313 C3	6313 C3						11500					
1.SZK 250 M	6314 C3	6314 C3						10000		20000			
1.SZK 280 M, S	NU 216	6216 C3						27	34	2500	5900	10500	13000
1.SZK 315 M, S	NU 217	6217 C3						19	24	1400/ 2800	3500/ 7000	5200/ 10500	7000/ 12500
1.SZK 315 M, S	6317 C3	6317 C3						22	28			4300/ 9500	6000/ 12000
SZK 315 M, S	6317 C3	6317 C3						37	46	1900	5500		



Bearing arrangement of electric motor in increased safety EExe

2.4 TECHNICAL DATA FOR SELECTION

3000 min⁻¹, 400 V, 50 Hz, Insulation class: F, Mechanical protection: IP 55, Temperature class: T1-T4.

Type	Output [kW]			n [min ⁻¹]	η [%]	cos φ	I _N [A]	M _N [Nm]	I _P / I _N	M _P / M _N	M _m / M _N	t _E [s]			KR	J [kgm ²]	Mass [kg]	
	T1,T2	T3	T4									T1,T2	T3	T4				
1.SZK 71	A-2A	0,37	0,37	-	2750	63	0,81	1,05	1,3	3,5	2,0	-	30	30	10	16	0,00023	5,4
	A-2B	0,32	0,32	0,32	2760	63	0,82	0,90	1,1	3,8	2,3	-	-	-	12	16	0,00023	5,4
	B-2A	0,55	0,55	-	2760	69	0,81	1,43	1,9	4,2	2,2	-	18	18	9	16	0,00033	6,3
	B-2B	0,42	0,42	0,42	2780	70	0,83	1,04	1,4	5,1	2,9	-	-	-	10	16	0,00033	6,3
1.SZK 80	A-2A	0,75	0,75	-	2770	72	0,80	1,87	2,6	4,8	2,3	-	20	20	9	16	0,00055	8,3
	A-2B	0,62	0,62	0,62	2775	73	0,82	1,49	2,1	5,8	2,8	-	-	-	12	16	0,00055	8,3
	B-2A	1,1	1,1	-	2770	73	0,84	2,58	3,8	4,7	2,3	-	18	12	6	16	0,00066	9,1
	B-2B	0,8	0,8	0,8	2775	74	0,85	1,84	2,	5,9	3,1	-	-	-	9	16	0,00066	9,1
SZK 90	S-2A	1,3	1,3	-	2880	76	0,83	2,97	4,3	6,1	2,4	3,2	20	20	-	16	0,00154	13,4
	S-2B	0,85	0,85	0,85	2905	77	0,83	1,92	2,8	6,6	2,7	3,2	25	25	14	16	0,00154	13,4
	L-2A	1,85	1,85	-	2900	80	0,82	4,07	6,1	7,0	2,8	3,2	13	13	-	16	0,00216	16,4
	L-2B	1,1	1,1	1,1	2915	79	0,82	2,45	3,6	7,2	3,0	3,6	24	24	14	16	0,00216	16,4
2.SZK 100	L-2A	2,5	2,5	-	2860	80	0,83	5,43	8,3	6,5	2,4	2,6	5	5	-	16	0,003	19
	L-2B	1,6	1,6	1,6	2920	80	0,70	4,12	5,2	7,8	3,0	3,1	-	-	5	16	0,003	19
2.SZK 112	M-2A	3,3	3,3	-	2885	84	0,86	6,60	10,9	7,6	3,2	3,3	10	10	-	16	0,005	24
	M-2B	2,2	2,2	2,2	2925	79	0,80	5,03	7,2	8,5	3,5	3,8	-	-	5	16	0,005	24
SZK 132	Sk-2B	4,6	4,6	-	2900	82	0,94	8,6	15,2	7,1	2,0	2,5	10	10	-	16	0,097	55
	Sk-2C	-	-	3,3	2905	82	0,93	6,2	11	7,4	2,2	2,6	19	19	11	16	0,097	55
	S-2A	6,5	-	-	2900	82,5	0,94	12	21,4	7,3	2,1	2,6	9	-	-	16	0,02	61,5
	S-2B	-	5,5	-	2900	82,5	0,94	10,3	18,1	7,4	2,1	2,6	9	9	-	16	0,02	61,5
	S-2C	-	-	4	2905	83	0,93	7,5	13,1	7,5	2,3	2,8	18	18	10	16	0,02	61,5
1.SZK 160	Mk-2A	9,5	-	-	2880	84,5	0,92	17,7	31,5	8,0	2,5	2,3	7	-	-	13	0,021	89
	Mk-2B	-	7,5	-	2900	85	0,92	14,7	24,6	7,4	2,8	2,6	7	7	-	16	0,021	89
	Mk-2C	-	-	5	2910	85	0,93	9,2	16,4	7,7	2,6	2,4	-	-	7	13	0,021	89
	M-2A	13	-	-	2890	85,5	0,92	24	43,0	8,2	2,5	2,5	6	-	-	13	0,028	108,5
	M-2B	-	10	-	2900	85,5	0,93	18,2	32,8	8,0	3,0	2,6	6	6	-	13	0,028	108,5
	M-2C	-	-	6,5	2910	85,5	0,93	11,8	21,2	7,8	2,8	2,6	-	-	6	13	0,028	108,5
	L-2A	16	-	-	2895	87	0,92	29	52,7	8,0	2,5	2,7	7	-	-	13	0,034	113
	L-2B	-	12,5	-	2900	86,5	0,93	22,5	41,1	7,7	3,1	2,6	6	6	-	13	0,034	113
	L-2C	-	-	8	2910	86,5	0,93	14,7	26,1	7,6	2,7	2,5	-	-	6	13	0,034	113
SZK 180	M-2A	19	-	-	2920	88,5	0,92	33,7	62,2	8,0	2,0	2,8	6,5	-	-	10	0,057	138
	M-2B	-	15	-	2930	88	0,92	26,8	48,2	8,5	2,1	3,0	-	6,5	-	10	0,057	138
1.SZK 200	Lk-2A	25	-	-	2935	90	0,87	46	81,4	6,5	1,7	2,5	10	-	-	10	0,11	199,5
	Lk-2B	-	20	-	2945	89,5	0,87	37,1	64,9	8,3	1,7	2,7	-	8	-	10	0,11	199,5
	L-2A	31	-	-	2940	90,5	0,88	56,2	100,7	6,6	1,7	2,5	10	-	-	10	0,13	215
	L-2B	-	24	-	2950	90	0,88	43,7	77,7	8,4	1,6	2,6	-	9	-	10	0,13	215
1.SZK 225	M-2A	38	-	-	2960	92,2	0,89	67	123	7,5	1,8	2,9	11	-	-	10	0,23	290
	M-2B	-	28	-	2960	91,5	0,89	50	90	7,8	1,8	2,9	14	10	-	10	0,23	290
1.SZK 250	M-2A	47	-	-	2965	92,5	0,90	81,5	151	7,5	1,8	2,9	13	-	-	10	0,36	395
	M-2B	-	36	-	2965	92,2	0,90	63	116	7,8	1,8	2,9	17	11	-	10	0,36	395
1.SZK 280	S-2A	64	-	-	2970	93	0,91	109	206	7,8	1,6	2,6	14	-	-	7	0,67	510
	S-2B	-	47	-	2970	92,8	0,91	81	151	8,2	1,7	2,6	17	13	-	7	0,67	510
	M-2A	76	-	-	2970	93,3	0,91	129	244	7,7	1,6	2,5	15	-	-	7	0,81	600
	M-2B	-	58	-	2970	93	0,90	100	187	8,0	1,6	2,5	16	13	-	7	0,81	600
SZK 315	S-2A	95	-	-	2981	93,5	0,92	159	304	7,7	1,4	2,7	16	-	-	7	1,55	810
	S-2B	-	68	-	2983	93,2	0,91	116	218	8,2	1,5	2,7	20	15	-	7	1,55	810
	M-2A	112	-	-	2982	94	0,92	187	359	7,8	1,3	2,7	15	-	-	7	1,8	890
	M-2B	-	80	-	2985	93,6	0,91	136	256	8,4	1,4	2,8	19	15	-	7	1,8	890

Note: Electric motors of frame size 355 and over on a special request !

1500 min⁻¹, 400 V, 50 Hz, Insulation class: F, Mechanical protection: IP 55, Temperature class: T1-T4.

Type	Output [kW]			n [min ⁻¹]	η [%]	cos φ	I _N [A]	M _N [Nm]	I _P / I _N	M _P / M _N	M _m / M _N	t _E [s]			KR	J [kgm ²]	Mass [kg]	
	T1,T2	T3	T4									T1,T2	T3	T4				
1.SZK 71	A-4A	0,25	0,25	0,25	1345	63	0,76	0,75	1,77	3,2	1,7	1,9	60	60	30	13	0,00038	5,3
	A-4B	0,22	0,22	0,22	1370	62	0,74	0,69	1,53	3,3	1,8	2,0	-	-	35	13	0,00038	5,3
	B-4A	0,37	0,37	0,37	1370	66	0,75	1,07	2,58	3,5	2,0	2,1	50	50	20	13	0,00055	6,3
	B-4B	0,32	0,32	0,32	1390	66	0,70	1,00	2,20	3,6	2,1	2,2	-	-	25	13	0,00055	6,3
1.SZK 80	A-4A	0,55	0,55	0,55	1375	69	0,76	1,51	3,80	3,5	1,8	1,9	34,5	31	8	13	0,0009	8,2
	A-4B	0,42	0,42	0,42	1410	73	0,65	1,28	2,84	3,6	1,9	2,0	-	-	10	13	0,0009	8,2
	B-4A	0,75	0,75	-	1375	71	0,75	2,02	5,20	3,7	2,0	2,1	22	22	10	13	0,0011	9,0
	B-4B	0,7	0,7	0,7	1375	72	0,74	1,90	4,86	3,9	2,2	2,3	-	-	12	13	0,0011	9,0
SZK 90	S-4A	1,0	1,0	-	1400	76	0,80	2,38	6,82	5,4	2,2	2,7	24	24	-	13	0,00247	13,2
	S-4B	0,8	0,8	0,8	1400	76	0,82	1,85	5,46	5,3	2,2	2,6	30	30	15	13	0,00247	13,2
	L-4A	1,35	1,35	-	1410	74	0,77	3,42	9,14	5,9	3,0	3,2	18	18	-	16	0,0034	16,9
	L-4B	1,2	1,2	1,2	1420	80	0,81	2,67	8,07	6,6	2,4	3,5	27	27	6	16	0,0034	16,9
2.SZK 100	L-4A	2,0	2,0	-	1410	78	0,78	4,75	13,55	5,9	2,4	2,8	10	10	-	16	0,0054	20,5
	L-4B	1,5	1,5	1,5	1435	78	0,65	4,27	9,88	5,6	2,8	2,9	-	-	5	16	0,0054	20,5
	Ld-4A	2,5	2,5	-	1410	75	0,77	6,27	16,93	6,2	2,7	2,9	10	10	-	16	0,0071	22,6
	Ld-4B	1,7	1,7	1,7	1440	75	0,62	5,28	11,27	6,4	2,7	2,9	-	-	5	16	0,0071	22,6
2.SZK 112	M-4A	3,6	3,6	-	1430	80	0,78	8,33	24,04	6,5	2,9	3,2	5	5	-	16	0,013	28,4
	M-4B	2,4	2,4	2,4	1450	79	0,70	6,26	15,81	5,7	2,3	2,6	-	-	5	16	0,013	28,4
SZK 132	S-4A	5	-	-	1445	86,5	0,84	10,0	33,0	6,0	2,1	2,7	12	-	-	16	0,035	61,5
	S-4B	-	5	-	1445	86,5	0,84	10,0	33,0	6,0	2,1	2,7	12	12	-	16	0,035	61,5
	S-4C	-	-	3,5	1450	86,5	0,83	7	23,0	5,9	2,0	2,6	17	17	8	16	0,035	61,5
	M-4A	6,8	-	-	1445	87,0	0,85	13,3	45,0	6,0	2,2	2,8	14	-	-	16	0,045	73
	M-4B	-	6,8	-	1445	87,0	0,85	13,3	45,0	6,5	2,6	2,8	14	14	-	16	0,045	73
	M-4C	-	-	4,1	1450	87,0	0,84	8,1	27,0	5,9	2,0	2,6	21	21	10	16	0,045	73
1.SZK 160	M-4A	10	-	-	1445	86	0,81	20,5	66,8	7,3	3,2	3,6	8	-	-	16	0,055	89,5
	M-4B	-	10	-	1445	87	0,81	20,5	66,8	7,3	3,2	3,6	8	8	-	16	0,055	89,5
	M-4C	-	-	6,4	1450	87	0,83	12,8	42,6	7,0	3,3	3,7	22	22	6	16	0,055	89,5
	L-4A	13,5	-	-	1445	88	0,83	26,7	90,2	6,5	3,1	3,6	8	-	-	16	0,073	118
	L-4B	-	13,5	-	1445	88	0,83	26,7	90,2	6,5	3,1	3,6	8	8	-	16	0,073	118
	L-4C	-	-	8,5	1450	88	0,84	16,6	56,6	6,0	3,2	3,7	23	23	7	16	0,073	118
1.SZK 180	M-4A	17	-	-	1460	89	0,82	33,6	111	6,2	2,6	2,4	11	-	-	16	0,086	140
	M-4B	-	15	-	1465	89	0,82	29,7	98	7,0	2,9	2,7	-	10	-	16	0,086	140
	L-4A	20	-	-	1460	90	0,82	39,1	131	6,2	2,6	2,4	11	-	-	16	0,102	155
	L-4B	-	17,5	-	1465	90	0,82	34,2	114	7,0	2,9	2,7	-	10	-	16	0,102	155
1.SZK 200	L-4A	27	-	-	1460	90,7	0,88	49,0	175	6,2	2,3	2,3	12	-	-	16	0,27	230
	L-4B	-	24	-	1475	90,7	0,87	44,0	155	7,0	2,6	2,6	14	14	-	16	0,27	230
1.SZK 225	S-4A	33	-	-	1475	92	0,88	59,0	214	7,6	1,8	2,7	11	-	-	13	0,362	280
	S-4B	-	30	-	1480	92	0,87	54	194	8,4	2,0	3,0	-	11,5	-	13	0,362	280
	M-4A	40	-	-	1475	92,4	0,88	71	260	7,5	1,8	2,7	10	-	-	13	0,442	320
	M-4B	-	36	-	1480	92,4	0,87	65	233	8,3	2,0	3,0	-	11	-	13	0,442	320
1.SZK 250	M-4A	50	-	-	1480	92,5	0,89	88	323	6,4	2,2	2,6	7,5	-	-	13	0,64	385
	M-4B	-	44	-	1485	92,8	0,89	77	283	7,3	2,5	3,0	-	8	-	13	0,64	385
1.SZK 280	S-4A	68	-	-	1480	93,4	0,90	117	439	6,4	1,8	2,4	13	-	-	13	1,1	525
	S-4B	-	58	-	1485	93,5	0,88	102	373	7,5	2,0	2,8	-	16	-	13	1,1	525
	M-4A	80	-	-	1480	93,8	0,90	137	516	6,6	1,8	2,5	16	-	-	13	1,31	603
	M-4B	-	70	-	1485	94	0,88	122	450	7,5	2,0	2,8	-	18	-	13	1,31	603
SZK 315	S-4A	100	-	-	1488	94	0,90	188	611	5,8	1,6	2,3	12	-	-	13	3,5	840
	S-4B	-	84	-	1488	94	0,88	155	708	6,7	1,8	2,7	-	14	-	13	3,5	840
	M-4A	120	-	-	1488	94	0,90	220	975	5,8	2,0	2,2	12	-	-	13	3,875	915
	M-4B	-	100	-	1488	94	0,89	180	611	6,7	2,2	2,6	-	14	-	13	3,875	915

Note: Electric motors of frame size 355 and over on a special request !

1000 min⁻¹, 400 V, 50 Hz, Insulation class: F, Mechanical protection: IP 55, Temperature class: T1-T4.

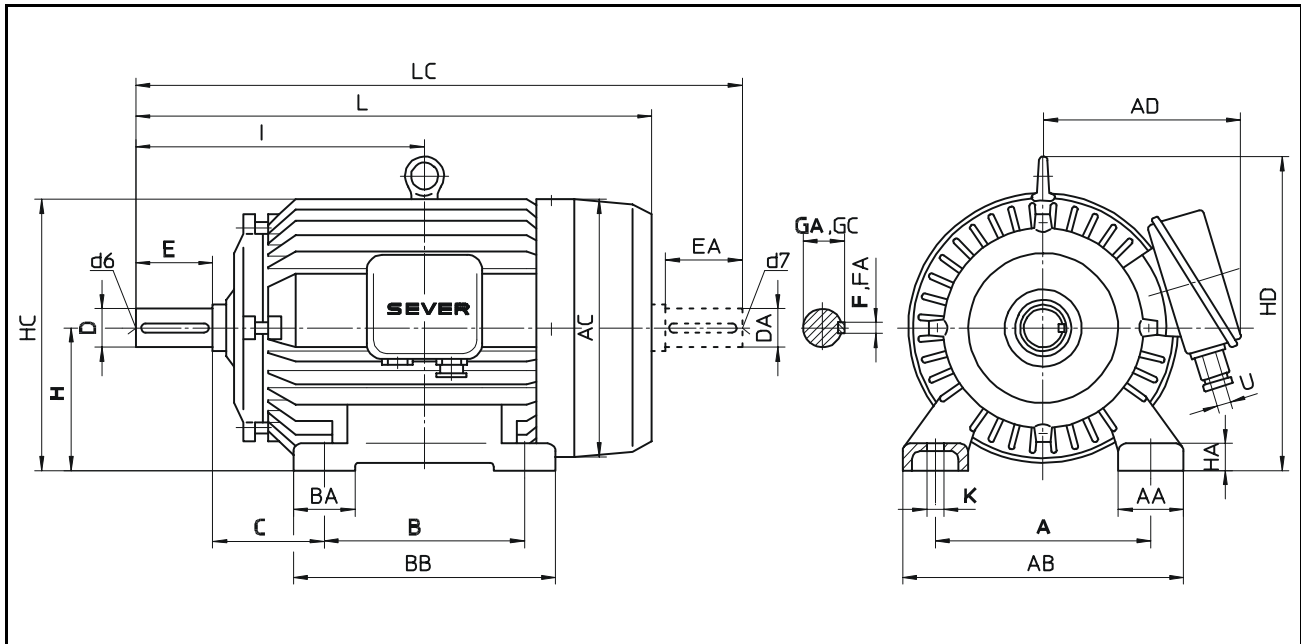
Type	Output [kW]			n [min ⁻¹]	η [%]	cos φ	I _N [A]	M _N [Nm]	I _P / I _N	M _P / M _N	M _m / M _N	t _E [s]			KR	J [kgm ²]	Mass [kg]	
	T1,T2	T3	T4									T1,T2	T3	T4				
1.SZK 71	A-6A	0,18	0,18	0,18	900	57	0,65	0,70	1,9	2,6	1,9	2,0	95	80	25	13	0,00055	6,1
	B-6A	0,25	0,25	0,25	890	57	0,64	0,99	2,7	2,6	1,8	2,1	93	77	24	13	0,00071	6,8
1.SZK 80	A-6A	0,37	0,37	0,37	915	66	0,69	1,17	3,9	3,6	2,0	2,2	150	150	54	13	0,0018	9
	B-6A	0,55	0,55	0,55	915	68	0,66	1,77	5,7	3,7	2,4	2,5	74	74	26,5	13	0,0024	11,6
SZK 90	S-6A	0,65	0,65	0,65	935	66	0,69	2,06	6,6	4,7	2,6	3,0	23	23	23	16	0,00247	13
	L-6A	0,95	0,95	0,95	920	67	0,73	2,80	9,9	4,8	2,4	2,8	18	18	6	16	0,0034	16,3
2.SZK 100	L-6A	1,3	1,3	-	930	67	0,70	4,04	13,3	4,2	2,2	2,4	15	15	5	13	0,0054	20,5
	L-6B	1,2	1,2	1,2	940	67	0,66	3,90	12,2	4,4	2,5	2,7	-	-	7	13	0,0054	20,5
2.SZK 112	M-6A	1,9	1,9	-	920	78	0,76	4,63	19,7	4,8	2,5	2,9	10	10	-	16	0,012	27
	M-6B	1,6	1,6	1,6	930	78	0,72	4,11	16,4	5,2	2,9	3,3	-	-	7	16	0,012	27
SZK 132	S-6B	2,6	2,6	-	960	84	0,79	5,7	26	6,0	2,4	2,7	14	-	-	16	0,035	57
	S-6C	-	-	2,2	960	84	0,79	5,7	26	6,0	2,4	2,7	14	14	-	16	0,035	57
	Mk-6B	3,5	3,5	-	950	86	0,80	7,3	36	6,4	2,5	2,8	13	13	-	16	0,0425	68
	Mk-6C	-	-	3,0	950	86	0,80	6,3	30	6,6	2,7	3,1	14	14	6,5	16	0,0425	68
	M-6B	4,8	4,8	-	955	87	0,81	9,9	49	6,4	2,2	2,6	9	9	-	16	0,05	75,5
	M-6C	-	-	4,0	955	86	0,80	8,4	40	6,6	2,2	2,6	11	11	6	16	0,05	75,5
1.SZK 160	M-6B	6,6	6,6	-	950	84	0,78	14,5	66,4	6,5	2,0	2,4	16	16	-	16	0,049	90
	M-6C	-	-	5,0	950	84	0,78	11	66,4	6,7	2,1	2,5	30	21	5,5	16	0,049	90
	L-6B	9,7	9,7	-	950	86	0,78	21	97,5	6,9	2,2	2,5	15	-	-	16	0,070	120
	L-6C	-	-	7,0	950	86	0,78	15,2	97,5	7,3	2,3	2,6	15	8	6	16	0,070	120
1.SZK 180	L-6B	13,2	13,2	-	960	87,5	0,83	26,6	131	6,0	2,2	2,7	15	15	-	16	0,144	150
1.SZK 200	Lk-6B	16,5	16,5	-	970	89	0,83	32,3	163	6,5	2,0	2,7	14	14	-	13	0,225	205
	L-6B	20	20	-	970	90	0,83	39	197	6,5	2,0	2,7	11	11	-	13	0,27	230
1.SZK 225	M-6B	27	27	-	975	91	0,84	51,3	265	6,5	2,0	2,7	19	19	-	13	0,656	330
1.SZK 250	M-6B	33	33	-	980	91	0,85	65	322	6,3	2,0	2,2	16	15	-	13	0,90	390
1.SZK 280	S-6B	40	40	-	985	92,5	0,87	72	388	7,3	2,4	2,7	14	14	-	13	1,5	500
	M-6A	50	-	-	986	92,9	0,88	89	484	7,1	2,3	2,7	-	13	-	13	1,82	560
	M-6B	-	46	-	987	92,8	0,87	82	445	7,7	2,5	2,8	15	-	-	13	1,82	560
1.SZK 315	S-6A	68	-	-	987	92,6	0,86	123	658	7,7	2,4	2,9	19	-	-	13	2,7	730
	S-6B	-	64	-	988	92,7	0,86	116	619	8,2	2,6	3,1	-	13	-	13	2,7	730
	M-6A	82	-	-	986	93	0,88	145	794	7,6	2,3	2,9	18	-	-	13	3,18	840
	M-6B	-	76	-	988	93	0,87	136	735	8,2	2,5	3,1	-	13	-	13	3,18	840

750 min⁻¹, 400 V, 50 Hz, Insulation class: F, Mechanical protection: IP 55, Temperature class: T1-T4.


Type	Output [kW]			n [min ⁻¹]	η [%]	cos φ	I _N [A]	M _N [Nm]	I _P / I _N	M _P / M _N	M _m / M _N	t _E [s]			KR	J [kgm ²]	Mass [kg]	
	T1,T2	T3	T4									T1,T2	T3	T4				
1.SZK 71	A-8A	0,09	0,09	0,09	670	43	0,50	0,60	1,28	2,2	1,8	2,0	55	55	22	16	0,00055	6,1
	B-8A	0,12	0,12	0,12	680	46	0,50	0,75	1,68	2,0	1,9	2,2	25	25	13	16	0,00071	6,8
1.SZK 80	A-8A	0,18	0,18	0,18	680	55	0,55	0,86	2,53	2,8	2,2	2,5	30	30	15	16	0,0018	9
	B-8A	0,25	0,25	0,25	690	57	0,56	1,13	3,46	2,8	2,3	2,5	35	35	15	16	0,0024	11,6
SZK 90	S-8A	0,37	0,37	0,37	700	66	0,65	1,24	5,05	3,5	2,0	2,2	55	55	20	16	0,00247	13
	L-8A	0,5	0,5	0,5	700	69	0,67	1,56	6,82	4,0	2,8	2,8	75	75	50	16	0,0034	16,3
2.SZK 100	L-8A	0,65	0,65	0,65	700	64	0,62	2,36	8,87	3,7	2,0	2,4	20	20	10	13	0,0054	20,5
	Ld-8A	0,95	0,95	0,95	680	64	0,65	3,30	13,34	3,5	2,1	2,4	20	20	10	13	0,0071	22,6
2.SZK 112	M-8A	1,3	1,3	1,3	700	71	0,67	3,94	17,74	3,6	2,0	2,2	25	25	10	13	0,012	27
SZK 132	S-8B	1,9	1,9	-	705	78	0,70	5	25,7	4,5	1,6	2,2	16	16	-	13	0,035	54
	M-8AB	2,6	2,6	-	710	79	0,72	6,7	35,0	4,5	1,6	2,3	15	15	-	13	0,050	70,5
1.SZK 160	Mk-8B	3,5	3,5	-	710	78	0,68	9,5	47	4,5	1,9	2,2	14	14	-	13	0,037	87
	M-8B	4,8	4,8	-	710	80	0,68	12,8	64,5	4,6	1,9	2,2	12	12	-	13	0,053	91,5
1.SZK 180	L-8B	6,6	6,6	-	710	82	0,69	16,8	89	4,6	1,9	2,2	11	11	-	13	0,076	122
	L-8B	9,7	9,7	-	715	84	0,74	23	130	5,0	1,9	2,1	11	11	-	13	0,160	160
1.SZK 200	L-8B	13,2	13,2	-	720	87	0,73	30,5	175	5,0	1,8	2,2	10	10	-	13	0,225	205
1.SZK 225	S-8B	16,5	16,5	-	735	88,5	0,78	34,7	214	5,0	1,7	2,2	14	14	-	13	0,470	245
	M-8B	20	20	-	735	89,5	0,78	42	260	5,0	1,7	2,2	15	15	-	13	0,560	285
1.SZK 250	M-8B	27	27	-	735	90	0,80	54	351	5,0	1,6	2,2	10	10	-	13	0,870	370
1.SZK 280	S-8B	33	33	-	740	91,5	0,80	65	426	6,1	1,7	2,2	18	18	-	13	1,5	495
	M-8B	40	40	-	740	92	0,81	78	516	6,2	1,6	2,2	17	17	-	13	1,82	580
1.SZK 315	S-8B	50	50	-	740	92	0,82	96	645	6,5	1,7	2,4	16	16	-	10	2,56	750
	M-8B	68	68	-	740	92,5	0,83	128	877	6,2	1,5	2,3	15	15	-	10	3,32	870

Note: Electric motors of frame size 355 and over on a special request !

2.5 OUTLINE DRAWINGS


Type: **1.SZK**Protection: **EExe**Temperature class: **T1 - T4****IM B3 - IM 1001**


Type	Pole	A	AA	AB	AC	AD	B	BA	BB	C	D	DA	d6	d7	E	EA	F	FA	GA	GC	H	HA	HC	HD	I	K	L	LC	Cable gland	
1.SZK 160	M	2,4,6,8	254	60	314	285	246	210	260	108	42	42	M16	M16	110	110	12	12	45	45	160	23	300,5	345	323	589	709	Pg 29x29		
	L	2,4,6,8						254	304																345	633	753			
1.SZK 180	M	2,4	279	70	349	323	260	241	296	121	48	48	M16	M16	110	110	14	14	51,5	51,5	180	28	343	387	351,5	652	772	Pg 29x29		
	L	4,6,8						279	334																370,5	690	810			
1.SZK 200 Lk,L	2,4,6,8	318	80	398	369	289	305	95	375	133	55	55	M20	M20	110	110	16	16	59	59	200	30	387,5	440	395,5	756	876	Pg 36x37		
1.SZK 225	S	4,8					286	355		60	60				140	140	18	18	64	64					432	805	960	Pg 36x37		
	2	356	90	446	418	337		110	149	55	55	M20	M20		110	110	16	16	59	59	225	35	438	500	414,5	800	925			
	M	4,6,8					311	380		60	60				140	140	18	18	64	64					444,5	830	985			
1.SZK 250	S	2	406	100	508	474	360	349	95	430	168	60	60	M20	M20	140	140	18	18	64	64	250	40	487,5	549	482,5	906	1061	Pg 36x37	
	M	4,6,8									65	65							69	69										
1.SZK 280	S	2					368	450		65	65							18	18	69	69				514	973	1128	Pg 36x37		
	4,6,8	457	110	567	510	379		112	190	75	75	M20	M20	140	140			20	20	79,5	79,5	280	45	535	607		539		1024	1179
	M	2					419	500		65	65							18	18	69	69									
1.SZK 315	S	6,8	508	125	633	562	427	406	500	216	80	80	M20	M20	170	170	22	22	85	85	315	50	598,5	669	589	1102	1277	Pg 42x42		
	M	6,8					457	550		75	75							20	20	79,5	79,5				614,5	1153	1328			

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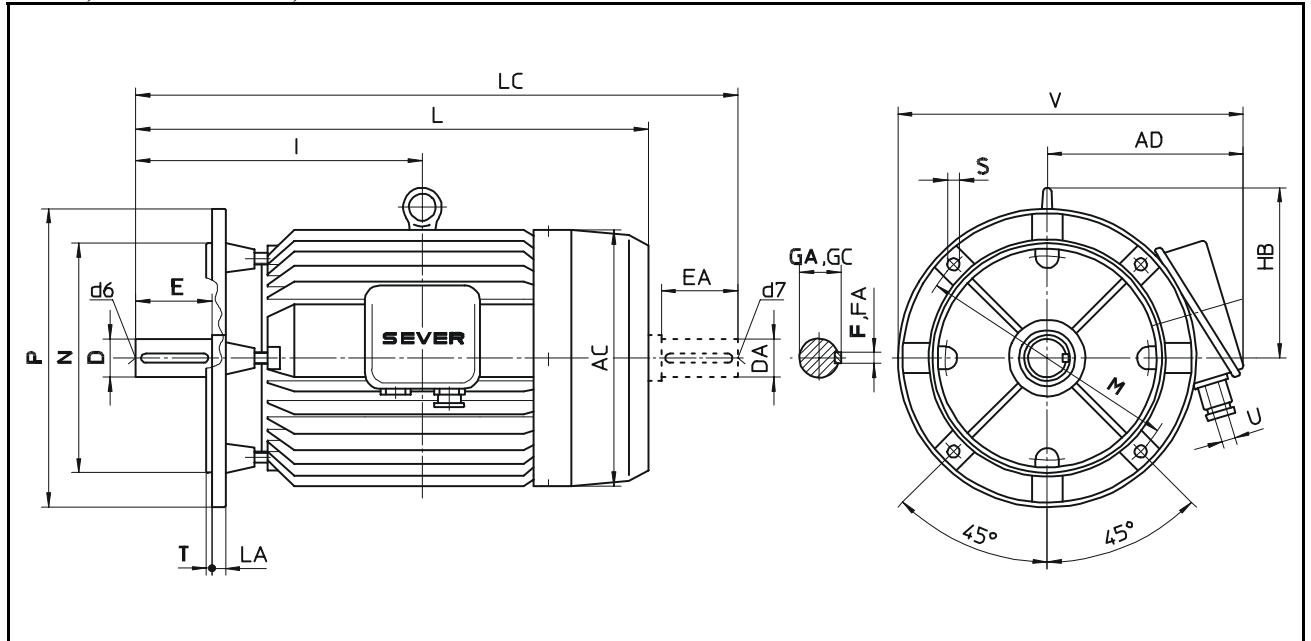
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Type: 1.SZK
Protection: EExe
Temperature class: T1 - T4

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IM B5, IM V1 - IM 3001, IM 3011



Type	Pole	Flange	AC	AD	D	DA	d6	d7	E	EA	F	FA	GA	GC	HB	I	L	LA	LC	M	N	P	S	Num. of holes	T	V	Cable gland	
1.SZK 160	Mk	2,4,6,8	FF 300	285	246	42	42	M16	M16	110	110	12	12	45	45	185	323	589	20	709	300	250	350	19	4	4	421	Pg 29x29
	M	2,4,6,8															345	633		753								
	L	2,4,6,8																										
1.SZK 180	M	2,4	FF 300	325	260	48	48	M16	M16	110	110	14	14	51,5	51,5	207	351,5	652	20	772	300	250	350	19	4	5	435	Pg 29x29
	L	2,4,6															370,5	690		810								
1.SZK 200 Lk,L		2,4,6,8	FF 350	369	299	55	55	M20	M20	110	110	16	16	59	59	240	395,5	756	20	876	350	300	400	19	4	5	499	Pg 36x37
1.SZK225	S	4,6,8	FF 400	418	337	60	60	M20	M20	140	140	18	18	64	64	275	432	805	20	960	400	350	450	18	8	5	537	Pg 36x37
	M	2				55	55			110	110	16	16	59	59		414,5	800		925								
		4,6,8				60	60			140	140	18	18	64	64		444,5	830		985								
1.SZK 250	M	2	FF 500	471	360	60	60	M20	M20	140	140	18	18	64	64	299	482,5	906	22	1061	500	450	550	19	8	5	635	Pg 36x37
		4,6,8				65	65			140	140	18	18	69	69		514	973		1128								
1.SZK 280	S	2	FF 500	510	379	65	65	M20	M20	140	140	18	18	69	69	327	514	973	22	1128	500	450	550	19	8	5	654	Pg 36x37
		4,6,8				75	75			140	140	18	18	79,5	79,5		539,5	1024		1179								
	M	2				65	65			140	140	18	18	69	69		539,5	1024		1179								
1.SZK 315	S	6,8	FF 600	562	427	80	80	M20	M20	170	170	22	22	85	85	344,5	589	1102	25	1277	600	550	660	24	8	6	757	Pg 42x42
	M	6,8				614,5	1153			1328																		

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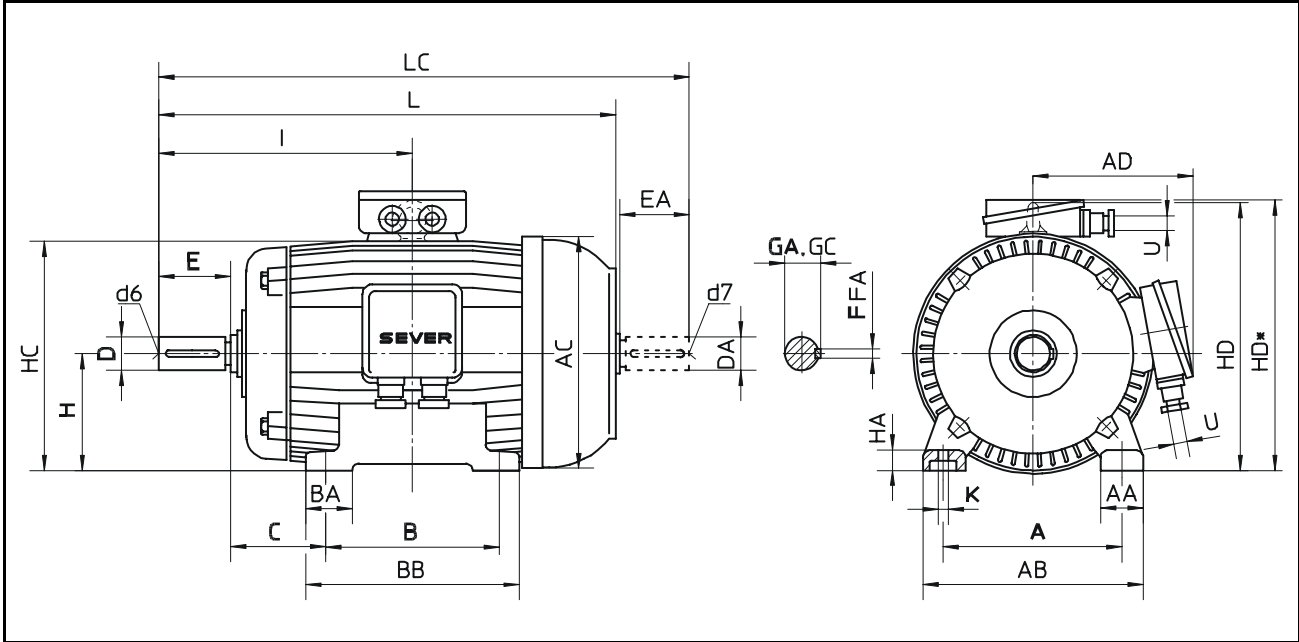
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Type: .SZK
 Protection: EExe
 Temperature class: T1 - T4

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IM B3 - IM 1001



Type	Pole	A	AA	AB	AC	AD	B	BA	BB	C	D	DA	d6	d7	E	EA	F	FA	GA	GC	H	HA	HC	HD	HD*	I	K	L	LC	Cable gland											
1.SZK 71	2,4,6,8	112	35	142	139	-	90	33	114	45	14	11	M5	M5	30	23	5	4	16	12,5	71	10	139	-	191	120	7	241	267	Pg 13,5x13											
1.SZK 80	2,4,6,8	125	41	155	157	-	100	40	130	50	19	14	M6	M6	40	30	6	5	21,5	16	80	11	156	-	210	140	10	271	304	Pg 13,5x13											
SZK 90	S	2,4,6,8	140	40	180	178	-	100	40	130	56	24	24	M8	M8	50	50	8	8	27	27	90	15	178	-	250	156	10	300	356	Pg 13,5x13										
	L																															125	155	155	168,5	325	381				
2.SZK 100	L	2,4,6,8	160	44	204	198	-	140	48	175	63	28	28	M10	M10	60	60	8	8	31	31	100	16	198	-	274	193	12	370	438	Pg 13,5x13										
	Ld	4,8																																							
2.SZK 112	M	2,4,6,8	190	46	236	222	-	140	48	175	70	28	28	M10	M10	60	60	8	8	31	31	112	20	222	-	311	200	12	377	445	Pg 21x20										
SZK132	Sk	2	216	55	271	260	214	-	52	180	89	38	38	M12	M12	80	80	10	10	41	41	132	22	261	307	-	239	12	441	529	Pg 21x20										
	S	2,4,6,8																																							
	M k	6																														258	479	567							
	M	2,4,6,8																																							
SZK 315	S	2	508	125	633	598	447	-	406	150	500	-	216	-	M20	M20	65	65	-	-	69	69	315	50	615	705	-	559	28	1072	1232	Pg 42x42									
		4																															170	170	22	22	85	85	589	1102	1292
		2																															140	140	18	18	69	69	584,5	1123	1283
	M	4																															170	170	22	22	85	85	614,5	1153	1343

Note: for frame size from 71 up to 112 terminal box is on the top,
 for frame size from 132 up to 315 terminal box is on the right-hand side.

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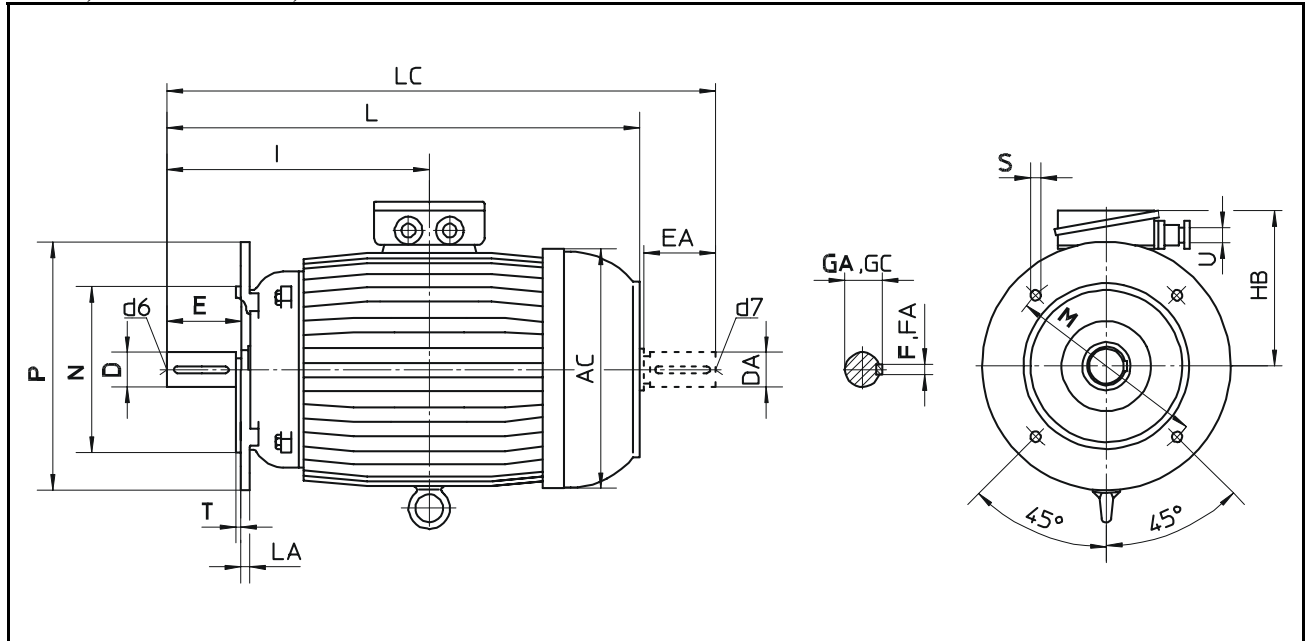
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Type: .SZK
Protection: EExe
Temperature class: T1 - T4

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IM B5, IM V1 - IM 3001, IM 3011



Type	Pole	Flange	AC	AD	D	DA	d6	d7	E	EA	F	FA	GA	GC	HB	I	L	LA	LC	M	N	P	S	Num. of holes	T	V	Cable gland									
1.SZK 71	2,4,6,8	FF130	139	120	14	11	M5	M5	30	23	5	4	16	12,5	120	120	241	10	267	130	110	160	10	4	3,5	200	Pg 13,5x13									
1.SZK 80	2,4,6,8	FF165	157	130	19	14	M6	M6	40	30	6	5	21,5	16	130	140	271	12	304	165	130	200	12	4	3,5	230	Pg 13,5x13									
SZK 90	S	2,4,6,8	FF165	178	160	24	24	M8	M8	50	50	8	8	27	27	160	156	300	12	356	165	130	200	12	4	3,5	260	Pg 13,5x13								
	L	2,4,6,8															168,5	325		381																
2.SZK 100	L	2,4,6,8	FF215	198	174	28	28	M10	M10	60	60	8	8	31	31	174	193	370	16	438	215	180	250	15	4	4	299	Pg 13,5x13								
	Ld	2,4,6																																		
2.SZK 112 M	2,4,6,8	FF215	222	199	28	28	M10	M10	60	60	8	8	31	31	199	200	377	16	445	215	180	250	15	4	4	324	Pg 21x20									
SZK 132	Sk	2	FF265	260	214	38	38	M12	M12	80	80	10	10	41	41	175	239	441	20	529	265	230	300	15	4	4	364	Pg 21x20								
	S	4,6,8															258	479		567																
	Mk	2																																		
	M	4,6,8																																		
SZK 315	S	2	FF600	598	447	65	65	M20	M20	140	140	18	18	69	69	390	559	1072	25	1232	600	550	660	24	8	6	747	Pg 42x42								
	4	2															65	80		170									170	22	22	85	85	589	1102	1292
	M	4															598	447		80									80	170	170	22	22	85	85	614,5

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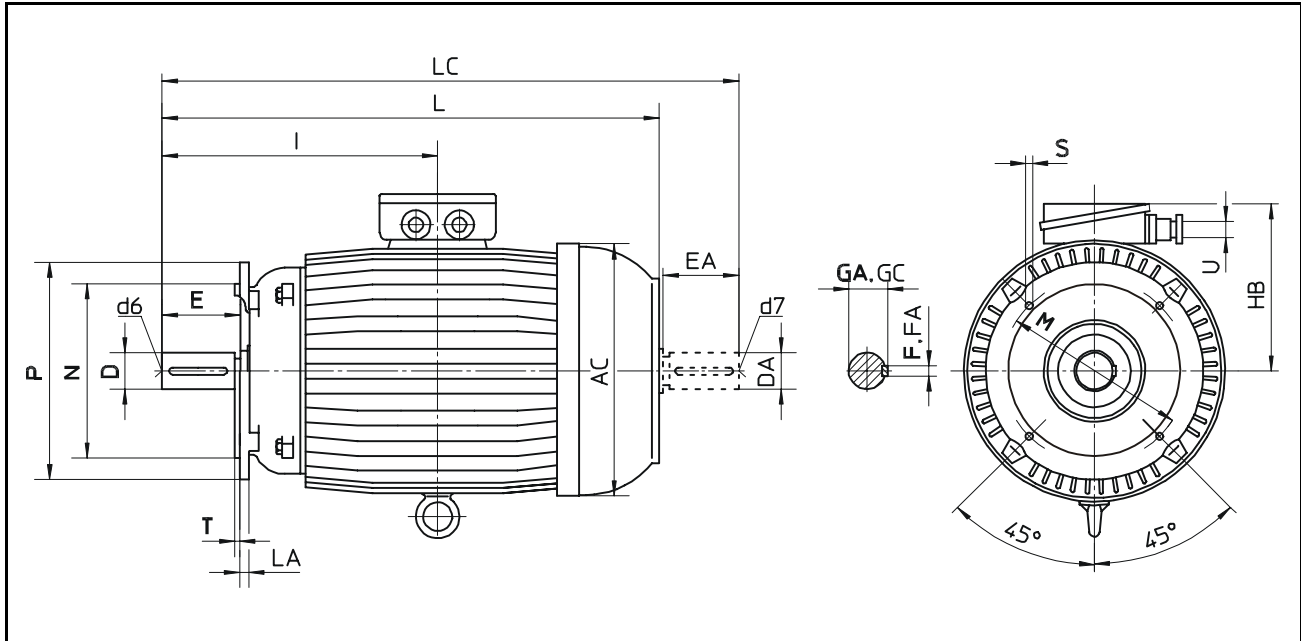
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Type: .SZK
Protection: EExe
Temperature class: T1 - T4

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IM B14 - IM 3601



Type	Pole	Flange	AC	AD	D	DA	d6	d7	E	EA	F	FA	GA	GC	HB	I	L	LA	LC	M	N	P	S	T	Cable gland
1.SZK 71	2,4,6,8	F 85	139	120	14	11	M5	M5	30	23	5	4	16	12,5	120	120	241	8	267	85	70	105	M6	2,5	Pg 13,5x13
	2,4,6,8	F 115																10		115	95	140	M8	3	
1.SZK 80	2,4,6,8	F 100	157	130	19	14	M6	M6	40	30	6	5	21,5	16	130	140	271	8	304	100	80	120	M6	3	Pg 13,5x13
	2,4,6,8	F 130																10		130	110	160	M8	3,5	
SZK 90	2,4,6,8	F 115	178	169	24	24	M8	M8	50	50	8	8	27	27	160	156	300	10	356	115	95	140	M8	3	Pg 13,5x13
	2,4,6,8	F 130																						3,5	
L	2,4,6,8	F 115														168,5	325		381	115	95	140		3	Pg 13,5x13
	2,4,6,8	F 130																		130	110	160		3,5	
L	2,4,6,8	F 130																10		130	110	160	M8		Pg 13,5x13
	2,4,6	F 165																12		165	130	200	M10	3,5	
Ld	2,4,6,8	F 130	198	174	28	28	M10	M10	60	60	8	8	31	31	174	193	370	10	438	130	110	160	M8		Pg 13,5x13
	2,4,6	F 165																12		165	130	200	M10		
2.SZK 112	2,4,6,8	F 130	222	199	28	28	M10	M10	60	60	8	8	31	31	199	200	377	10	445	130	110	160	M8	3,5	Pg 21x20
	2,4,6,8	F 165																12		165	130	200	M10		

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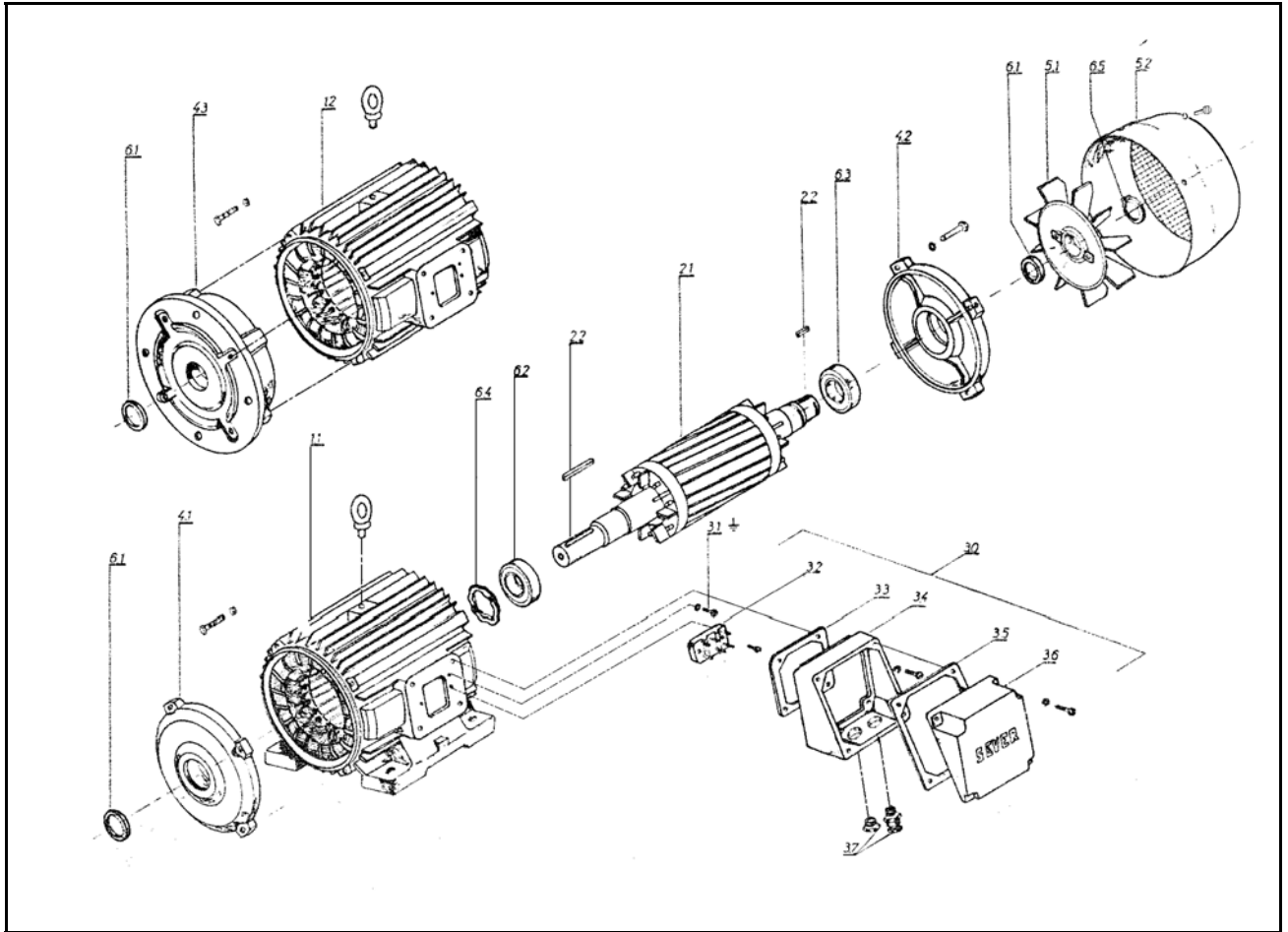
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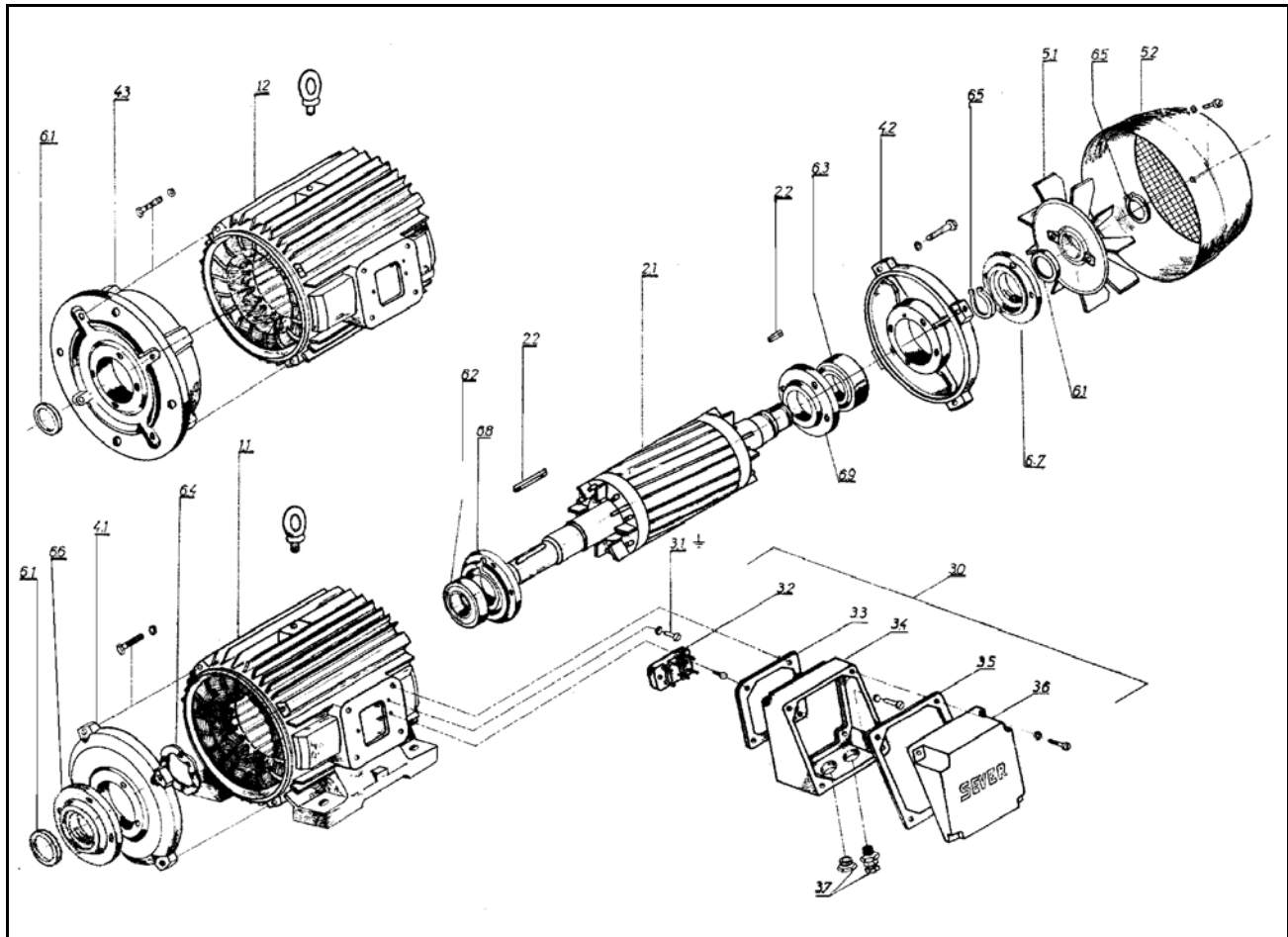
2.6 PARTS

PARTS OF ELECTRIC MOTORS

MOTOR TYPE: **SKZ 132-160**

ITEM	DESCRIPTION
1.1	STATOR - SET IM B3
1.2	STATOR - SET IM B5
2.1	ROTOR - SET
2.2	ROTOR KEY
3.0	TERMINAL BOX - SET
3.1	EARTH TERMINAL
3.2	TERMINAL BOARD WITH ACCESSORIES (EExe)
3.3	GASKET FOR TERMINAL BOX FRAME
3.4	TERMINAL BOX FRAME
3.5	GASKET FOR TERMINAL BOX COVER
3.6	TERMINAL BOX COVER
3.7	CABLE GLAND
4.1	STATOR COVER - DRIVE SIDE (A)
4.2	STATOR COVER - FAN SIDE (B)
4.3	FLANGE
5.1	FAN
5.2	FAN COVER
6.1	RADIAL SHAFT SEAL
6.2	BEARING - DRIVE SIDE (A)
6.3	BEARING - FAN SIDE (B)
6.4	RESILIENT PRELOADING RING
6.5	CIRCLIP
6.6	BEARING COVER, EXTERNAL - DRIVE SIDE (A)
6.7	BEARING COVER, EXTERNAL - FAN SIDE (B)

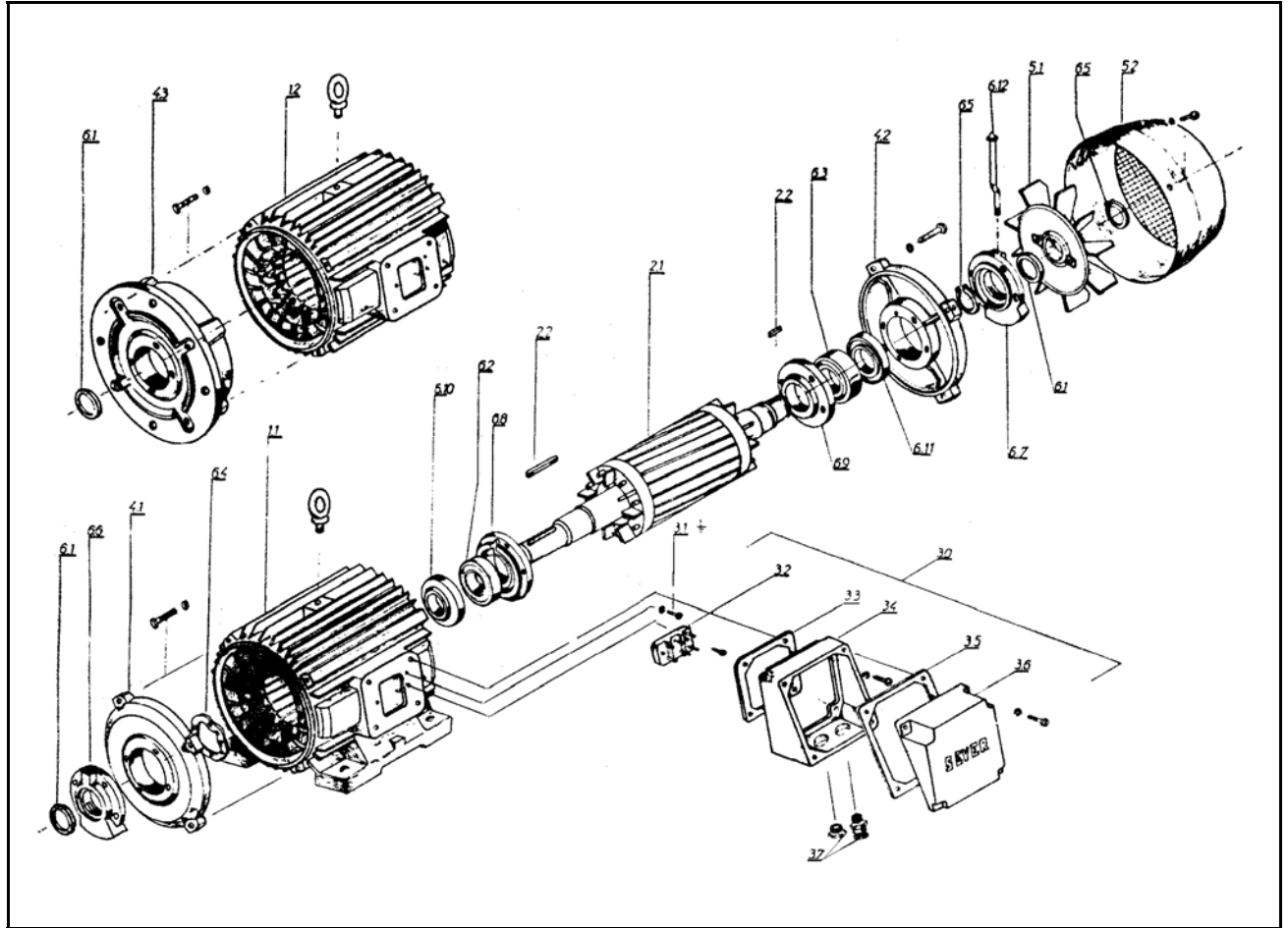
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ITEM	DESCRIPTION
1.1	STATOR - SET IM B3
1.2	STATOR - SET IM B5
2.1	ROTOR - SET
2.2	ROTOR KEY
3.0	TERMINAL BOX - SET
3.1	EARTH TERMINAL
3.2	TERMINAL BOARD WITH ACCESSORIES (EExe)
3.3	GASKET FOR TERMINAL BOX FRAME
3.4	TERMINAL BOX FRAME
3.5	GASKET FOR TERMINAL BOX COVER
3.6	TERMINAL BOX COVER
3.7	CABLE GLAND
4.1	STATOR COVER - DRIVE SIDE (A)
4.2	STATOR COVER - FAN SIDE (B)
4.3	FLANGE
5.1	FAN
5.2	FAN COVER
6.1	RADIAL SHAFT SEAL
6.2	BEARING - DRIVE SIDE (A)
6.3	BEARING - FAN SIDE (B)
6.4	RESILIENT PRELOADING RING
6.5	CIRCLIP
6.6	BEARING COVER, EXTERNAL - DRIVE SIDE (A)
6.7	BEARING COVER, EXTERNAL - FAN SIDE (B)
6.8	BEARING COVER, INTERNAL - DRIVE SIDE (A)
6.9	BEARING COVER, INTERNAL - FAN SIDE (A)

PARTS OF ELECTRIC MOTORS

MOTOR TYPE: 1.SZK 250-315



ITEM	DESCRIPTION
1.1	STATOR - SET IM B3
1.2	STATOR - SET IM B5
2.1	ROTOR - SET
2.2	ROTOR KEY
3.0	TERMINAL BOX - SET
3.1	EARTH TERMINAL
3.2	TERMINAL BOARD WITH ACCESSORIES (EExe)
3.3	GASKET FOR TERMINAL BOX FRAME
3.4	TERMINAL BOX FRAME
3.5	GASKET FOR TERMINAL BOX COVER
3.6	TERMINAL BOX COVER
3.7	CABLE GLAND
4.1	STATOR COVER - DRIVE SIDE (A)
4.2	STATOR COVER - FAN SIDE (B)
4.3	FLANGE
5.1	FAN
5.2	FAN COVER
6.1	RADIAL SHAFT SEAL
6.2	BEARING - DRIVE SIDE (A)
6.3	BEARING - FAN SIDE (B)
6.4	RESILIENT PRELOADING RING
6.5	CIRCLIP
6.6	BEARING COVER, EXTERNAL - DRIVE SIDE (A)
6.7	BEARING COVER, EXTERNAL - FAN SIDE (B)
6.8	BEARING COVER, INTERNAL - DRIVE SIDE (A)
6.9	BEARING COVER, INTERNAL - FAN SIDE (B)
6.10	GREASE QUANTITY REGULATOR - DRIVE SIDE (A)
6.11	GREASE QUANTITY REGULATOR - FAN SIDE (B)
6.12	RE-GREASING DEVICE

3. MOTORS IN PROTECTION OF FLAMEPROOF ENCLOSURE EExd

3.1 EXPLOSION-PROOF PROTECTION FLAMEPROOF ENCLOSURE EExd

The basic conception of the explosion proof protection flameproof enclosure EExd is that the parts of the electric device, which may cause ignition of explosive mixture, must be enclosed in an enclosure, which is the basic support of protection.

The enclosures are made of in a way so that:

- ◆ they can endure inner pressure of explosion without damage or not allowed deformation,
- ◆ they prevent penetrating ignition through the safety gaps in the external atmosphere.

I for application in mines,

II for application in surface industry.

Enclosures of group **II** are divided into subgroups **IIA**, **IIB** and **IIC** taking into consideration the classification of gases and vapours according to explosive groups. Classification of gases and vapours according to maximum experimental safety gap is given in the following table.

Equipment group	Group of gasses	Max. safety gap [mm] measured at length of 25 mm
II	A	gap ≥ 0.9
	B	$0.5 < \text{gap} < 0.9$
	C	gap < 0.5

Safety gap is provided by machining surface of the assembly parts with min. roughness of $3.2 \mu\text{m}$. Machining traces can be seen, but can not be perceived by fingers. According to the type, safety gaps are classified as flat, cylindrical, screw and labyrinth ones. During testing, a flameproof enclosure must satisfy the following:

- a) test control by increased pressure
- b) test control by penetrating ignition.

Test control by increased pressure is performed with the aim to establish the referent pressure of explosion, and it is made by explosion of the test mixture for the appropriate group of gases. This treatment must not cause permanent deformation or damage of the device enclosure.

Test control by penetrating ignition is performed on the following way: the apparatus enclosure is filled with explosive mixture, then, this mixture is ignited inside the device. In a number of conducted tests it is registered if ignition of surrounding test mixture occurs through the gaps of the tested apparatus. Assembly screws for flameproof enclosures must be secure of loosening by using their special designs and also by using suitable flexible safety washers. In addition, current connections can be tested by indirect entry through the terminal box in a flameproof enclosure EExd or in increased safety EExe.

Electric leads from the terminal box, towards the interior of the flameproof enclosure can be led only through flameproof bushings molded in the insulation mass.

The limit temperature and the temperature rise of the enclosure in the external atmosphere must not exceed the values of the corresponding temperature class.

3.2 DESIGN

3.2.1 Forms, mechanical protection, constructional characteristics and materials of electric motor EExd

Explosion-proof protection flameproof enclosure EExd is realized by cylindrical and flat gaps, which meet the requirements of the standard IEC 60079-1/EN 50018/DIN EN50018/VDE 0171-5.

Motors, type St 1.ZK.. are three phase induction squirrel cage electric motors, single or multi-speed, for mounting arrangements IMB3, IMB5, IMV3, IMV5 and IMV6 (IEC 60034-7, DIN 42950 04,64).Cooling system is IC 411 as per IEC 60034-6 and degree of mechanical protection is IP 54 as per IEC 60034-5, DIN IEC 60034-5/VDE 0530-5.The motors are designed for the following application fields:

- a) mines, i.e. pit mining **EExd I**
- b) surface industry **EExd II** for:
 - group of gases **A, B, C** and
 - temperature classes **T1-T4**

Electric motors are made with the insulation class **F**.

Materials for electric motors EExd

Frame size	Electric motor parts								
	Stator frame	Feet	Stator cover	Fan cover		Fan for both way rotation		Terminal box	
				Exd I	Exd II	Exd I	Exd II	Exd I	Exd II
71	cast iron	cast iron	cast iron	steel	steel	cast iron	aluminium alloy	cast iron	aluminium alloy
80									
90									
100									
112									
132									
160									
180	steel	welded							
200									
225									
250									
280									
315				steel					

3.2.2 Terminal box and assembly drawings

Terminal box is designed in two versions:

- a) Terminal box in increased safety EExe (fig.2) is made of aluminium alloy and it is with an interplate, where the outlet leads are molded in, and with a certified terminal board. Cable entries of a terminal box in explosion-proof protection EExe and EExd II are type Pg (DIN 46255).
- b) Cast iron terminal box (fig.3) has two chambers, one of which is in protection EExd and the other one is in protection EExe. Chambers are connected by three flameproof bushings. A certified cable gland with trumpet is fitted to the terminal box and this design is used with electric motors both for mines and for surface industry. This terminal box has three connections (flameproof bushings) and it is used only for motors with direct starting. On a special request, for electric motors in EExd I (for mines), the terminal box and the cable gland with trumpet can be protected with an additional shield, which protects the terminal box and the cable gland against mechanical damages.

Table for fig. 2.

Frame size	a	b	c	d	e	h	Cable gland as per DIN 46255 *	Terminal board **
71 and 80	90	36	-	14	66	62	Pg-13,5	KB1 Ex
90 and 100	104	36	-	14	73	84	Pg-13,5	KB1 Ex
112 and 132	128	42	-	21	92	94	Pg-21	KB2 Ex
160 and 180	148	55	-	30	105	105	Pg-29	KB3 Ex
200 and 225	170	70	-	38	120	110,5	Pg 36	KB4 Ex
250 and 280	200	70	-	38	135	128	Pg 36	KB4 Ex
315	250	80	-	43	165	142	Pg 42	KB5 Ex

Table for fig. 3.

Frame size	a	b	c	d	e	h	Cable gland with trumpet as per EN 50014 and EN 50018 *	Type of flameproof bushing **
71 and 80	160	115	98	15	172	105	Re-13,5	PI 16
90 and 100	176	126	110	15	188	113		
112	200	138	126	19	208	115	Re-16	PI 25
132							Re-21	
160 and 180	230	156	150	24	256	117	Re-29	PI 63
200 and 225	276	176	181	34	313	135	Re 36	PI 100
250 and 280	377	226	247	34	380	186	Re 36	PI 160
315	422	270	283	41	330	197	Re 42	PI 250

All dimensions in millimeters.

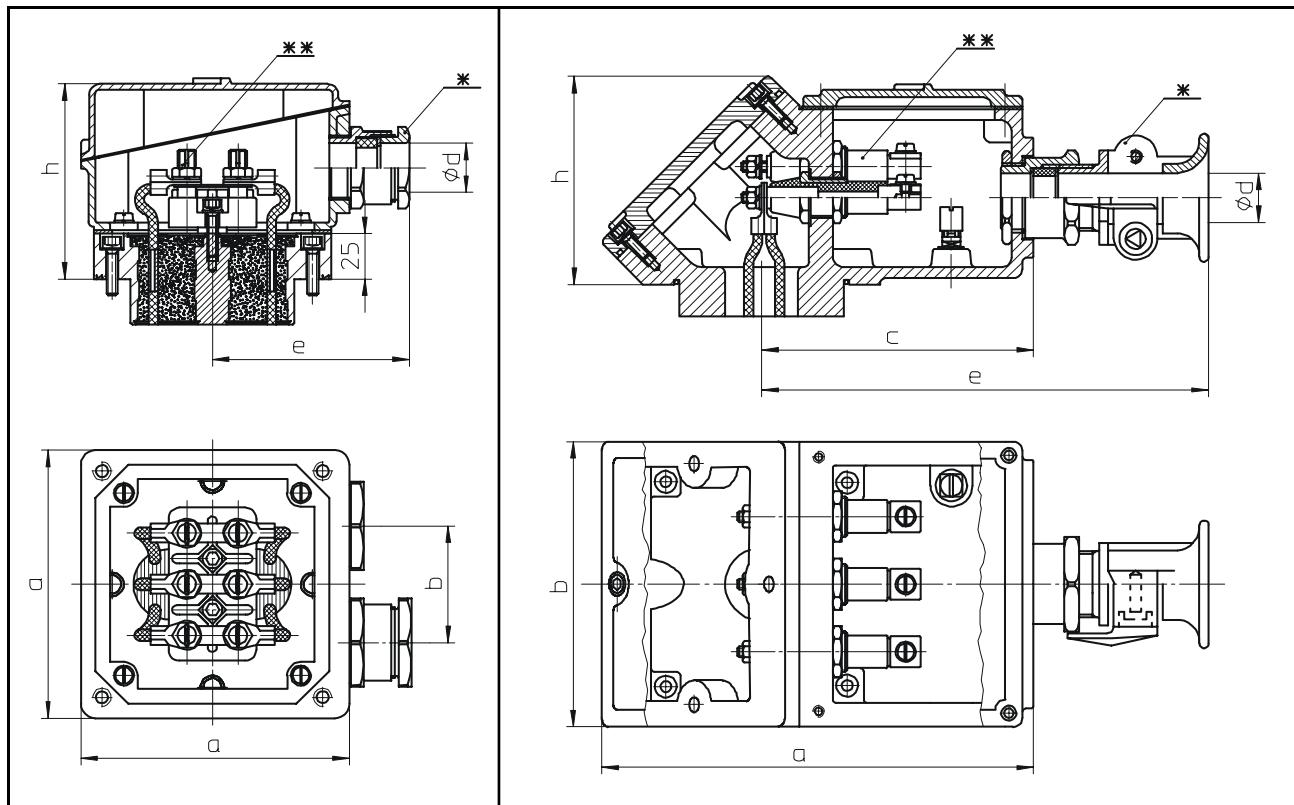
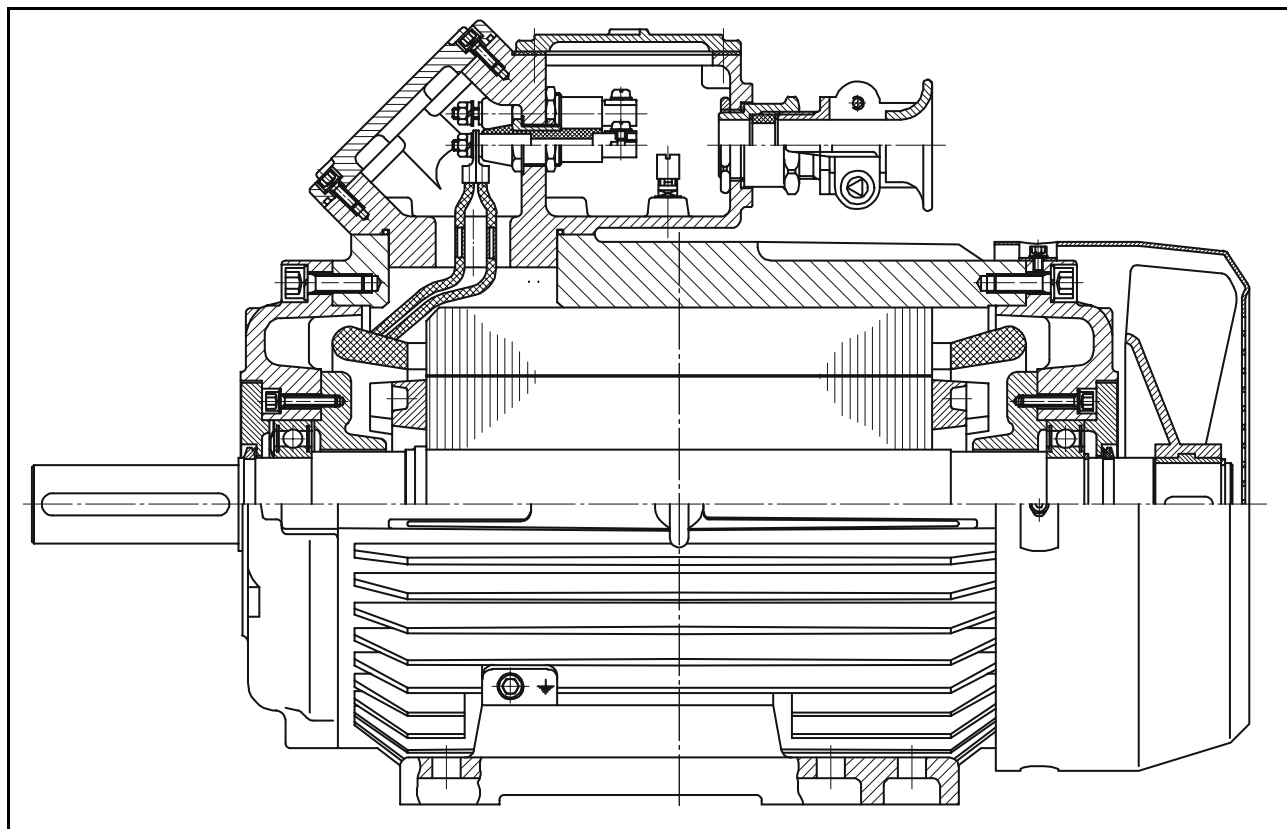
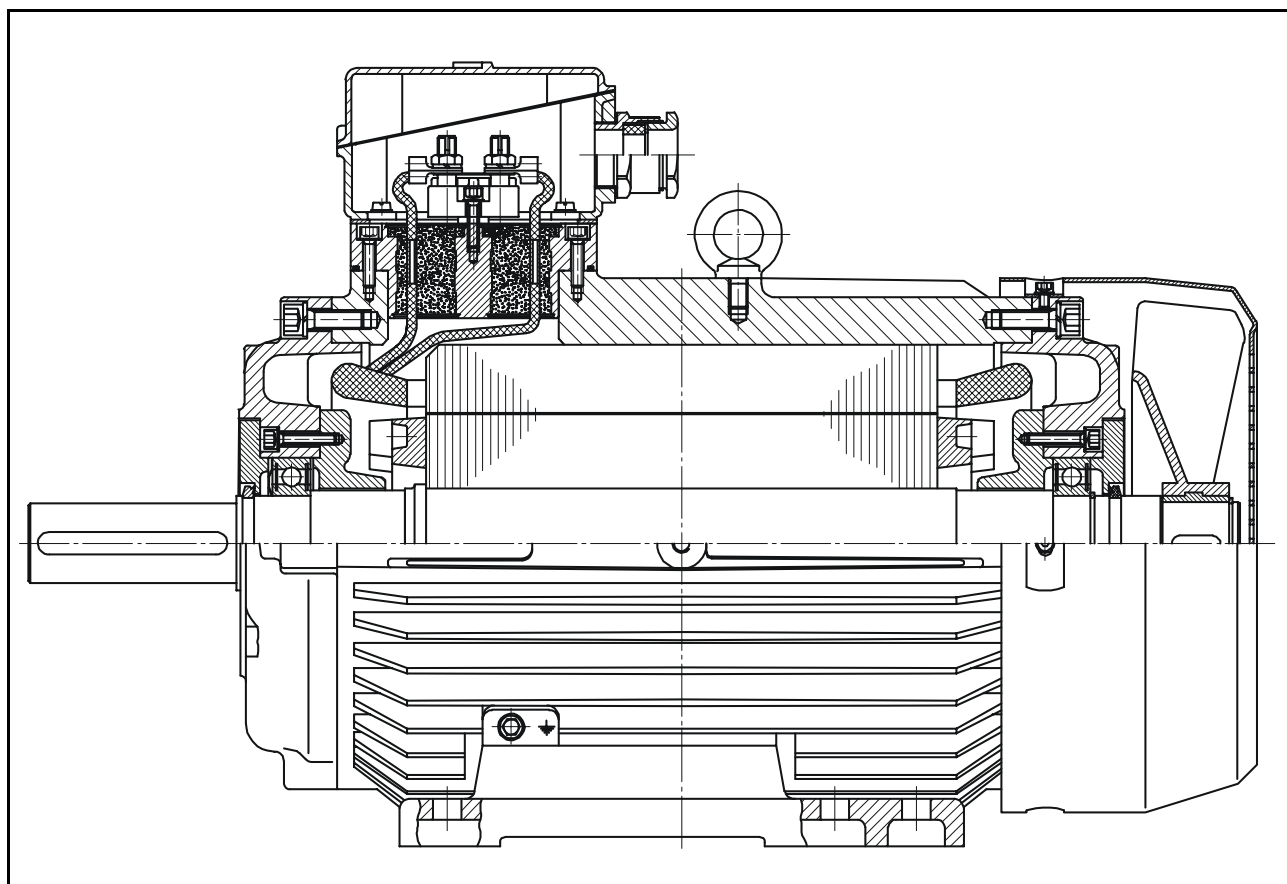


Fig. 2.

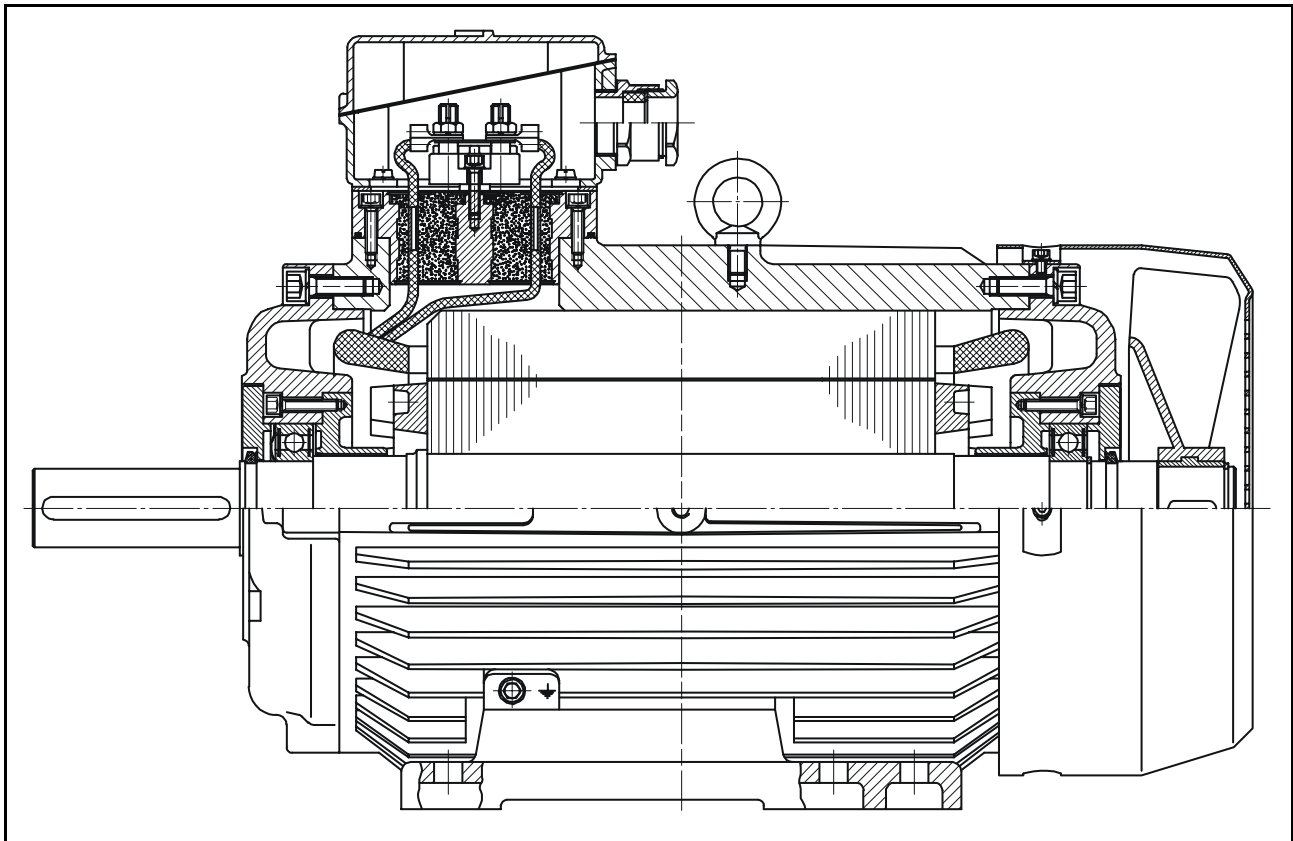
Fig. 3.



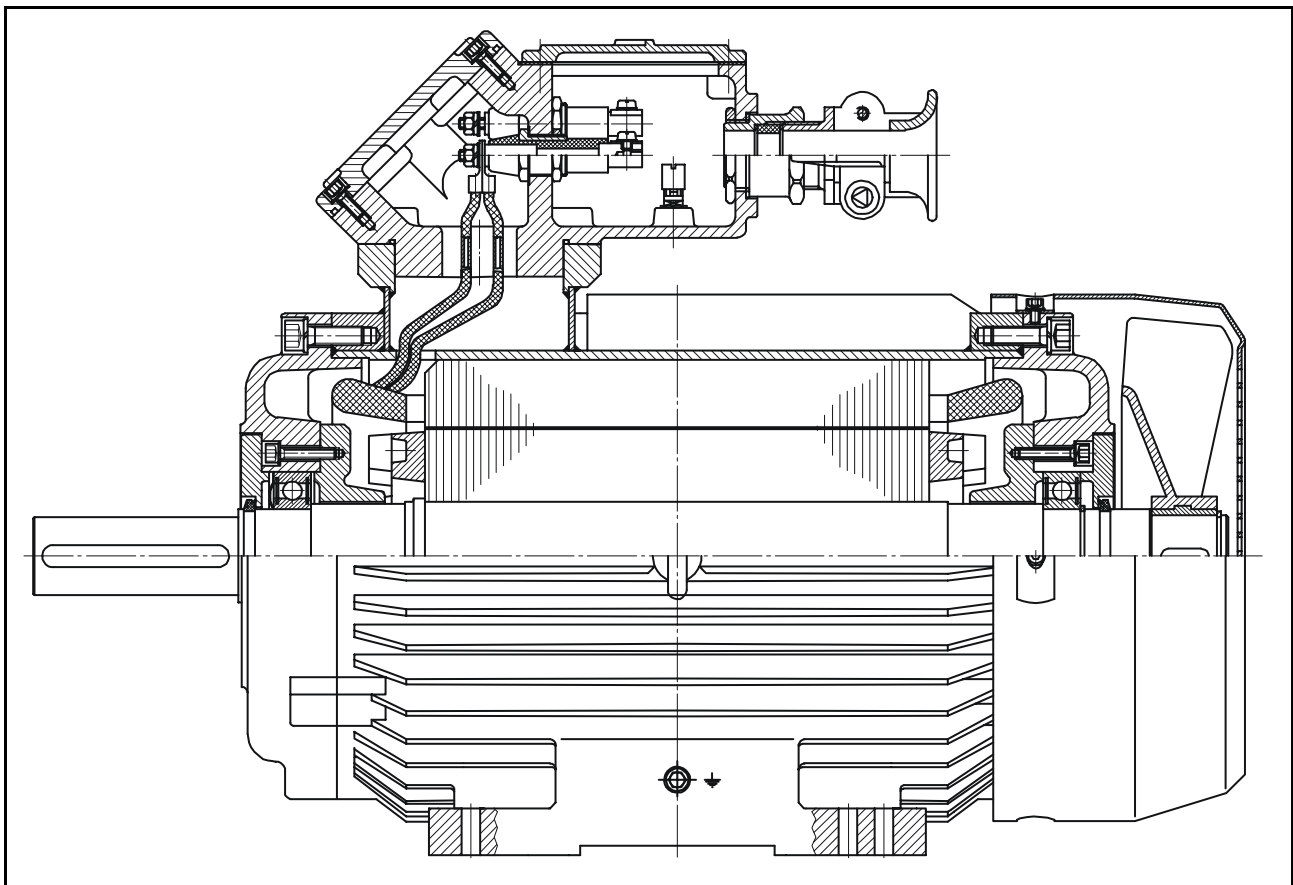
Assembly drawings - el.motor in explosion-proof protection, cast iron design with flameproof bushings, EExde I, EExde II B



Assembly drawings - el.motor in explosion-proof protection, cast iron design with molded outlet leads, EExde II B



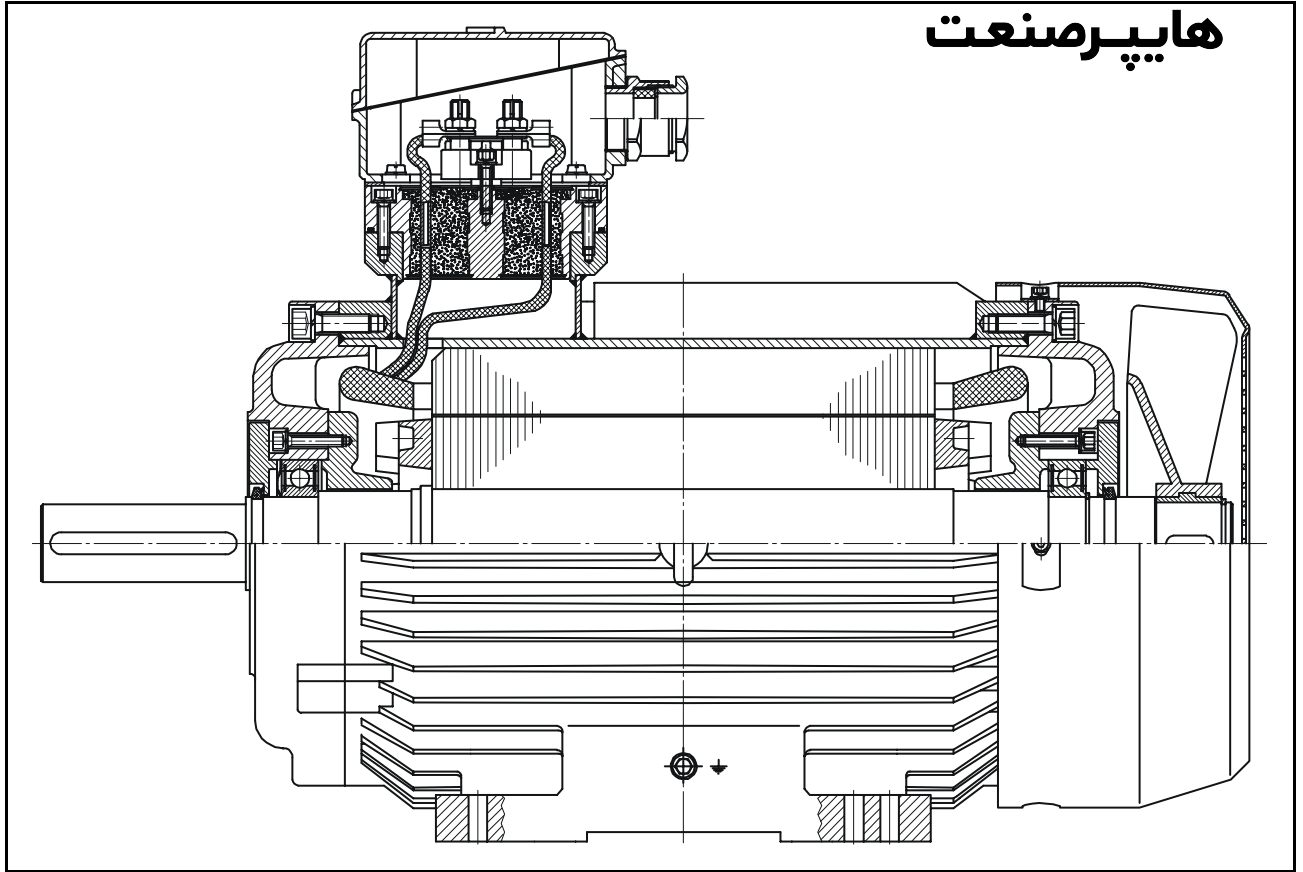
Assembly drawings - el.motor in explosion-proof protection, cast iron design with molded outlet leads, EExde II C



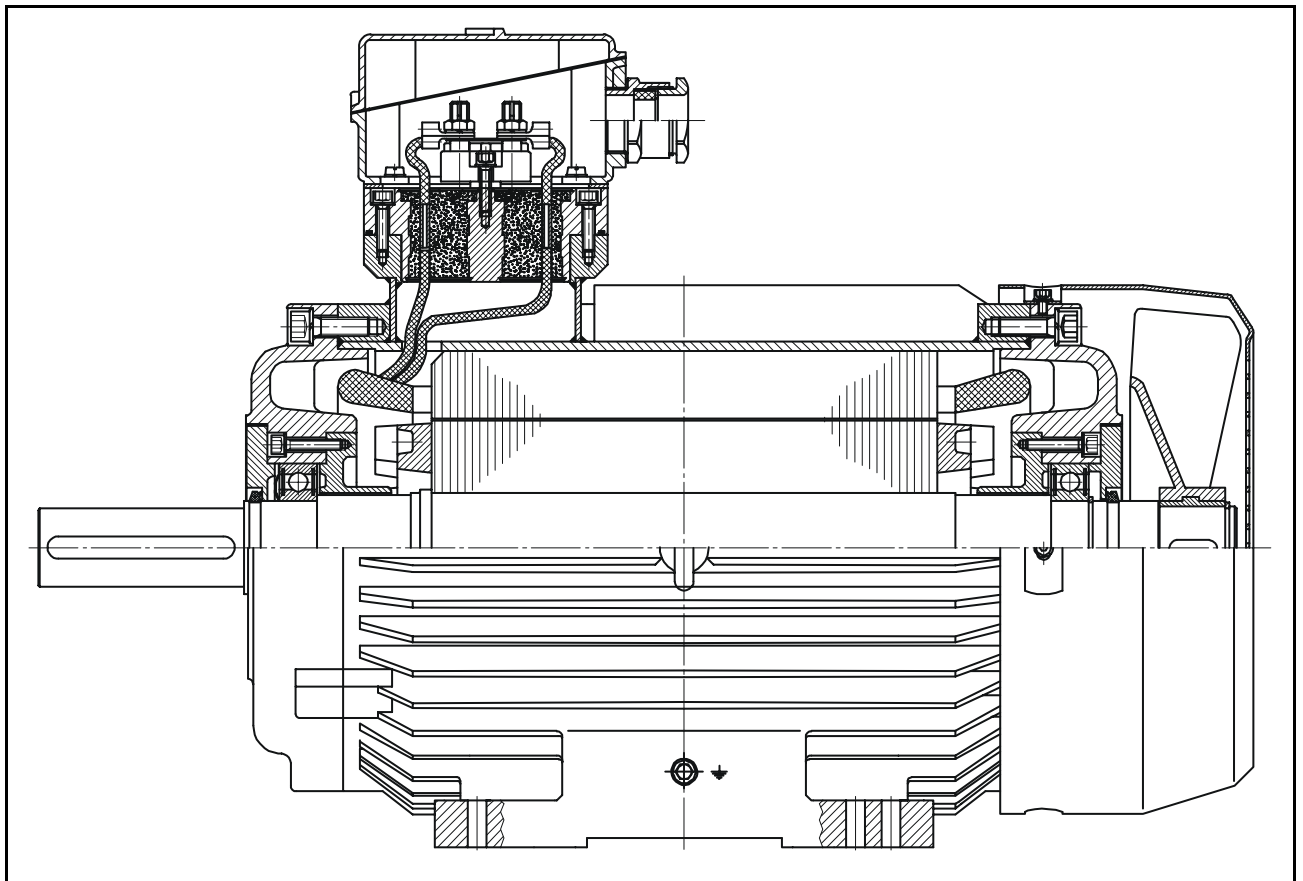
Assembly drawings - el.motor in explosion-proof protection, welded design with flameproof bushings, EExde I, EExde II B

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Assembly drawings - el.motor in explosion-proof protection, welded design with molded outlet leads,
EExde II B

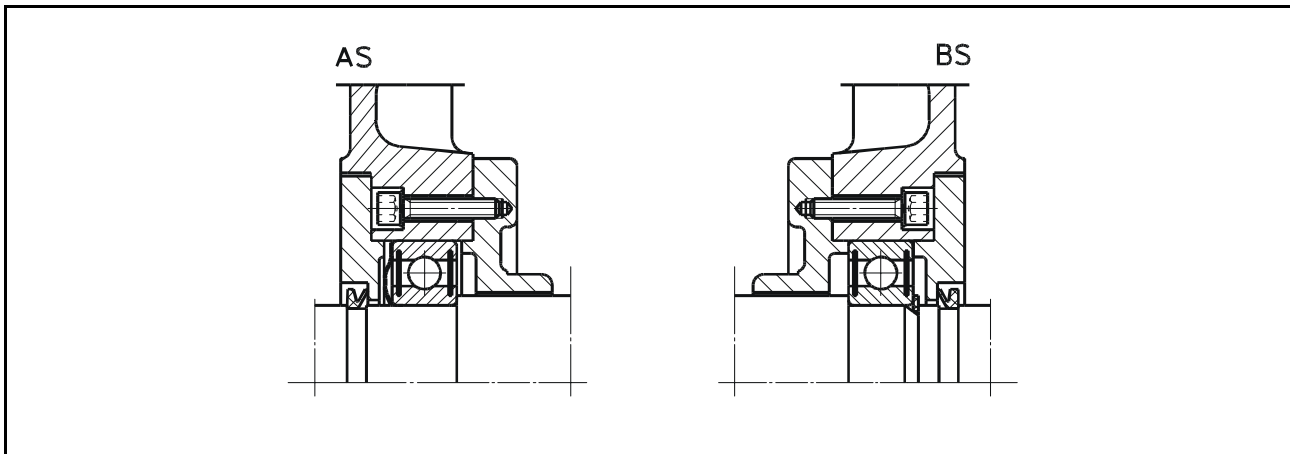


Assembly drawings - el.motor in explosion-proof protection, welded design with molded outlet leads,
EExde II C

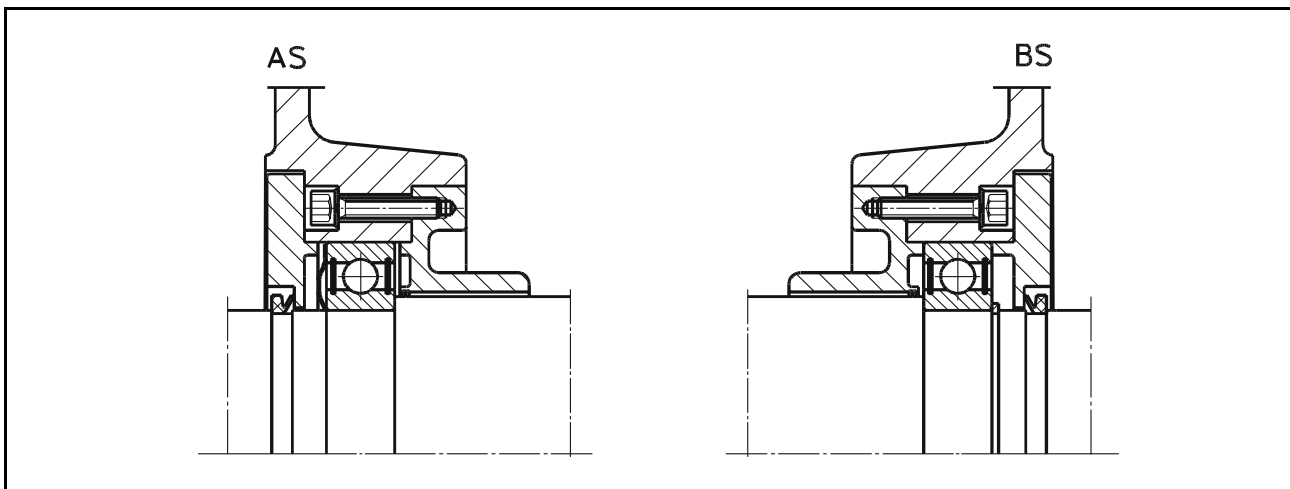
3.2.3 Bearing arrangement

Shaft of electric motor is arranged with roller bearings without possibility of re-lubrication. Motors of frame size 71 - 132 have non-fixed bearings on both sides, while the motors of frame size 160 - 315 have fixed fan side (BS) bearing and non-fixed drive side (AS) bearing. Types of bearings for normal duty conditions are given in the following table.

Frame size	Num. of poles	AS bearing	BS bearing
71	2,4,6,8	6203 2Z	6203 2Z
80	2,4,6,8	6204 2Z	6204 2Z
90	2,4,6,8	6205 2Z	6205 2Z
100	2,4,6,8	6206 2Z	6206 2Z
112	2,4,6,8	6206 2Z	6206 2Z
132	2,4,6,8	6208 2Z	6208 2Z
160	2,4,6,8	6210 2Z	6210 2Z
180	2,4,6,8	6310 2Z	6310 2Z
200	2,4,6,8	6312 2Z	6312 2Z
225	2,4,6,8	6314 2Z	6314 2Z
250	2,4,6,8	6315 2Z	6315 2Z
280	2,4,6,8	6316 2Z	6316 2Z
315	2,4,6,8	6317 2Z	6317 2Z



Bearing arrangement of electric motors in flameproof enclosure EExde I, EExde IIB



Bearing arrangement of electric motors in flameproof enclosure EExde IIC

3.3 TECHNICAL DATA FOR SINGLE-SPEED MOTORS SELECTION

3000 min⁻¹, 400 V, 50 Hz, Insulation class: F, Mechanical protection IP 55

Type	Output [kW]	n [min ⁻¹]	η [%]	cos φ	I _N [A]	M _N [Nm]	$\frac{I_p}{I_N}$	$\frac{M_p}{M_N}$	$\frac{M_m}{M_N}$	KR	J [kgm ⁴]	Mass [kg]	
St 1.ZK 71	A-2	0,37	2750	63	0,81	1,05	1,3	3,5	2,0	-	16	0,00023	16
	B-2	0,55	2760	69	0,81	1,43	1,9	4,2	2,2	-	16	0,00033	18
St 1.ZK 80	A-2	0,75	2770	72	0,80	1,87	2,6	4,8	2,3	-	16	0,00055	23
	B-2	1,1	2770	73	0,84	2,58	3,8	4,7	2,3	-	16	0,00066	24
St 1.ZK 90	S-2	1,5	2810	74	0,85	3,42	5,1	5,3	2,3	-	16	0,00123	28
	L-2	2,2	2830	80	0,85	4,66	7,4	6,3	2,9	-	16	0,00184	30
St 1.ZK 100	L-2	3	2830	80	0,86	6,27	10,0	6,5	2,4	2,6	16	0,003	38
St 1.ZK 112	M-2	4	2830	82	0,90	7,80	13,5	7,6	3,2	3,3	16	0,005	52
St 1.ZK 132	Sk-2	5,5	2840	82	0,90	10,74	18,5	7,5	3,6	3,8	16	0,01	81
	S-2	7,5	2860	84	0,90	14,25	25,0	8,0	3,7	4,0	16	0,013	87
St 1.ZK 160	Mk-2	11	2890	86	0,87	21	36	8,5	3,7	3,9	16	0,021	89
	M-2	15	2900	87	0,87	28	49	8,5	3,7	3,9	16	0,028	108
	L-2	18,5	2905	88	0,88	34	61	8,9	3,7	3,9	16	0,034	113
St 1.ZK 180	M-2	22	2920	89	0,87	41	72	8,0	3,5	3,4	16	0,057	138
St 1.ZK 200	Lk-2	30	2935	89,5	0,87	47	98	8,5	3,1	3,1	16	0,11	199
	L-2	37	2940	90	0,88	66	120	7,9	3,4	3,2	16	0,13	215
St 1.ZK 225	M-2	45	2960	92	0,88	80	145	7,5	2,7	4,9	16	0,23	290
St 1.ZK 250	M-2	55	2960	93	0,88	97	177	7,5	2,5	3,0	16	0,36	395
St 1.ZK 280	S-2	75	2960	93	0,90	130	242	7,5	2,1	4,8	16	0,67	510
	M-2	90	2965	93,5	0,89	158	290	7,5	2,4	3,0	16	0,81	600
St 1.ZK 315	S-2	110	2970	93,5	0,92	186	420	8,0	2,5	3,2	16	1,3	700
	M-2	132	2975	94	0,92	222	510	8,0	2,5	3,2	16	1,6	850

1500 min⁻¹, 400 V, 50 Hz, Insulation class: F, Mechanical protection IP 55

Type	Output [kW]	n [min ⁻¹]	η [%]	cos φ	I _N [A]	M _N [Nm]	$\frac{I_p}{I_N}$	$\frac{M_p}{M_N}$	$\frac{M_m}{M_N}$	KR	J [kgm ⁴]	Mass [kg]	
St 1.ZK 71	A-4	0,25	1345	63	0,76	0,75	1,77	3,2	1,7	1,9	13	0,00038	16
	B-4	0,37	1370	66	0,75	1,07	2,58	3,5	2,0	2,1	13	0,00055	18
St 1.ZK 80	A-4	0,55	1375	69	0,76	1,51	3,8	3,5	1,8	1,9	13	0,0009	23
	B-4	0,75	1375	71	0,75	2,02	5,2	3,7	2,0	2,1	13	0,0011	24
St 1.ZK 90	S-4	1,1	1410	74	0,78	2,76	7,5	4,5	2,0	2,2	16	0,0023	29
	L-4	1,5	1405	76	0,79	3,61	10	4,9	2,3	2,6	16	0,0032	30
St 1.ZK 100	L-4	2,2	1410	78	0,81	5,04	15	5,9	2,4	2,8	16	0,0054	41
	Ld-4	3	1410	76	0,80	7,13	20	6,2	2,7	2,9	16	0,0071	50
St 1.ZK 112	M-4	4	1420	81	0,82	8,65	27	6,5	2,9	3,2	16	0,013	64
St 1.ZK 132	S-4	5,5	1450	85	0,82	11,40	36	6,2	2,0	2,7	16	0,019	83
	M-4	7,5	1450	86	0,80	15,68	49	6,5	2,2	2,9	16	0,025	91
St 1.ZK 160	M-4	11	1440	88	0,82	22	73	6,5	3,0	3,0	16	0,055	89
	L-4	15	1440	88	0,82	30	100	6,8	3,0	3,0	16	0,073	118
St 1.ZK 180	M-4	18,5	1460	89	0,82	36	121	6,5	2,8	2,6	16	0,086	140
	L-4	22	1460	90	0,83	42	144	6,5	2,8	2,6	16	0,102	155
St 1.ZK 200	L-4	30	1470	90	0,83	58	195	7,5	2,9	2,8	16	0,27	230
St 1.ZK 225	S-4	37	1470	92	0,86	68	240	6,5	2,3	2,5	16	0,362	280
	M-4	45	1470	92	0,86	82	292	6,5	2,3	2,5	16	0,442	320
St 1.ZK 250	M-4	55	1480	92,5	0,87	100	355	6,8	2,3	2,7	16	0,64	385
St 1.ZK 280	S-4	75	1480	93	0,87	135	486	7,5	2,6	2,8	16	1,10	525
	M-4	90	1480	93,5	0,87	162	581	7,5	2,6	2,8	16	1,31	610
St 1.ZK 315	S-4	110	1485	94	0,90	190	710	7,5	2,4	3,0	16	2,12	750
	M-4	132	1480	94,3	0,90	226	850	7,5	2,4	3,0	16	2,54	900

I_n - Rated Current

I_p - Locked-rotor Current

M_n - Rated Torque

M_m - Breakdown Torque

M_p - Locked-rotor Torque

KR - Rotor class

1000 min⁻¹, 400 V, 50 Hz, Insulation class: F, Mechanical protection: IP 55

Type	Output [kW]	n [min ⁻¹]	η [%]	cos φ	I _N [A]	M _N [Nm]	$\frac{I_p}{I_N}$	$\frac{M_p}{M_N}$	$\frac{M_m}{M_N}$	KR	J [kgm ⁴]	Mass [kg]	
St 1.ZK 71	A-6	0,18	900	57	0,65	0,70	1,9	2,6	1,9	2,0	13	0,00055	18
	B-6	0,25	890	57	0,64	0,99	2,7	2,6	1,8	2,1	13	0,00071	20
St 1.ZK 80	A-6	0,37	915	66	0,69	1,17	3,9	3,6	2,0	2,2	13	0,0018	24
	B-6	0,55	915	68	0,66	1,77	5,7	3,7	2,4	2,5	13	0,0024	26
St 1.ZK 90	S-6	0,75	920	70	0,72	2,14	7,8	3,8	2,0	2,2	16	0,0037	29
	L-6	1,1	920	70	0,70	3,33	11,2	3,8	2,2	2,4	16	0,0054	31
St 1.ZK 100	L-6	1,5	910	71	0,75	4,09	15,7	4,2	2,2	2,4	13	0,0054	41
St 1.ZK 112	M-6	2,2	925	76	0,75	5,61	22,7	4,8	2,5	2,9	16	0,012	58
St 1.ZK 132	S-6	3	945	81	0,76	7,03	30,3	4,5	2,0	2,4	13	0,015	77
	Mk-6	4	950	82	0,77	9,12	40,2	4,5	1,9	2,0	13	0,02	85
	M-6	5,5	950	83	0,77	12,35	55,3	4,5	1,9	2,1	13	0,028	96
St 1.ZK 160	M-6	7,5	950	84	0,78	16,5	75	5,5	2,0	2,4	16	0,049	90
	L-6	11	950	86	0,78	24	110	6,0	2,2	2,5	16	0,070	120
St 1.ZK 180	L-6	15	960	87,5	0,83	29	149	6,0	2,2	2,7	16	0,144	150
St 1.ZK 200	Lk-6	18,5	970	89	0,83	36	182	6,5	2,0	2,7	16	0,225	205
	L-6	22	970	90	0,83	43	417	6,5	2,0	2,7	16	0,27	230
St 1.ZK 225	M-6	30	975	91	0,84	57	494	6,5	2,0	2,7	16	0,656	330
St 1.ZK 250	M-6	37	980	91	0,85	69	361	6,0	2,0	2,2	13	0,9	390
St 1.ZK 280	S-6	45	982	92,5	0,87	82	438	6,9	2,4	2,8	16	1,5	500
	M-6	55	985	93	0,87	98	533	6,9	2,3	2,6	16	1,82	560
St 1.ZK 315	S-6	75	985	93	0,87	135	727	7,5	2,4	2,7	16	2,7	750
	M-6	90	985	93,5	0,88	159	872	7,5	2,4	2,7	16	3,2	900

750 min⁻¹, 400 V, 50 Hz, Insulation class: F, Mechanical protection IP 55

Type	Output [kW]	n [min ⁻¹]	η [%]	cos φ	I _N [A]	M _N [Nm]	$\frac{I_p}{I_N}$	$\frac{M_p}{M_N}$	$\frac{M_m}{M_N}$	KR	J [kgm ⁴]	Mass [kg]	
St 1.ZK 71	A-8	0,09	670	43	0,50	0,60	1,28	2,2	1,8	2,0	16	0,00055	18
	B-8	0,12	680	46	0,50	0,75	1,68	2,0	1,9	2,2	16	0,00071	20
St 1.ZK 80	A-8	0,18	680	55	0,55	0,86	2,53	2,8	2,2	2,5	16	0,0018	24
	B-8	0,25	690	57	0,56	1,13	3,46	2,8	2,3	2,5	16	0,0024	26
St 1.ZK 90	S-8	0,37	700	59	0,62	1,45	5,05	2,9	1,9	2,0	13	0,0037	29
	L-8	0,55	700	61	0,61	2,13	7,50	3,0	2,1	2,3	13	0,0054	31
St 1.ZK 100	L-8	0,75	690	64	0,67	2,52	10,4	3,7	2,0	2,4	13	0,0054	41
	Ld-8	1,1	670	64	0,70	3,52	15,7	3,5	2,1	2,4	13	0,0071	50
St 1.ZK 112	M-8	1,5	680	70	0,71	4,37	21,0	3,6	2,0	2,2	13	0,012	58
St 1.ZK 132	S-8	2,2	705	76	0,69	6,08	29,8	3,6	1,6	2,0	13	0,015	77
	M-8	3	710	79	0,69	7,89	40,4	3,5	1,6	1,9	13	0,028	96
St 1.ZK 160	Mk-8	4	690	78	0,68	10,8	54	4,7	2,1	2,4	13	0,037	87
	M-8	5,5	700	79	0,68	14,7	74	4,7	2,1	2,4	13	0,053	91,5
	L-8	7,5	710	81	0,70	19	101	4,9	2,1	2,4	13	0,076	122
St 1.ZK 180	L-8	11	715	84	0,74	25	148	4,8	2,1	2,3	13	0,16	160
St 1.ZK 200	L-8	15	720	87	0,73	34	199	5,5	2,0	2,4	13	0,225	205
St 1.ZK 225	S-8	18,5	735	88,5	0,78	39	240	5,3	1,9	2,4	13	0,47	245
	M-8	22	735	89,5	0,77	45,5	286	5,3	1,8	2,5	13	0,56	285
St 1.ZK 250	M-8	30	735	90	0,80	61	390	5,5	1,8	2,4	13	0,87	370
St 1.ZK 280	S-8	37	735	92	0,80	72	481	5,6	1,8	2,2	13	1,5	495
	M-8	45	735	92	0,81	87	585	5,6	1,8	2,2	13	1,82	580
St 1.ZK 315	S-8	55	740	92,5	0,82	104	710	7,1	2,0	3,0	13	2,56	750
	M-8	75	740	93	0,83	141	970	6,6	1,8	4,8	13	3,32	870

I_N - Rated CurrentI_p - Locked-rotor CurrentM_N - Rated TorqueM_m - Breakdown TorqueM_p - Locked-rotor Torque

KR - Rotor class

3.4 TECHNICAL DATA FOR TWO-SPEED MOTORS SELECTION

400 V, 50 Hz, Insulation class: F, Mechanical protection IP 55, Temperature class T1-T4

Dahlander winding Δ/Y

1500/3000 min^{-1}

Type		Output [kW]		n [min^{-1}]	
		2p=4	2p=2	2p=4	2p=2
St 1.ZK 71	A-4/2	0,21	0,28	1400	2800
	B-4/2	0,3	0,43	1410	2840
St 1.ZK 80	A-4/2	0,48	0,6	1410	2720
	B-4/2	0,7	0,85	1405	2800
St 1.ZK 90	S-4/2	1,0	1,4	1400	2800
	L-4/2	1,3	1,75	1400	2780
St 1.ZK 100	L-4/2	1,8	2,4	1400	2790
	Ld-4/2	2,4	3,0	1400	2800
St 1.ZK 112	M-4/2	3,0	4,0	1400	2830
St 1.ZK 132	S-4/2	4,5	5,7	1440	2830
	M-4/2	6,1	7,5	1450	2860
St 1.ZK 160	M-4/2	9	10,5	1450	2920
	L-4/2	12	15	1450	2920
St 1.ZK 180	M-4/2	14	17	1460	2920
	L-4/2	17	20	1460	2940
St 1.ZK 200	L-4/2	20	26	1460	2940
St 1.ZK 225	S-4/2	24	28	1480	2940
	M-4/2	29	34	1480	2970
St 1.ZK 250	M-4/2	36	45	1480	2970

750/1500 min^{-1}

Type		Output [kW]		n [min^{-1}]	
		2p=8	2p=4	2p=8	2p=4
St 1.ZK 80	A-8/4	0,14	0,28	680	1400
	B-8/4	0,22	0,37	680	1420
St 1.ZK 90	S-8/4	0,42	0,8	680	1390
	L-8/4	0,5	1,0	680	1390
St 1.ZK 100	L-8/4	0,8	1,6	680	1390
	Ld-8/4	1,0	1,9	670	1390
St 1.ZK 112	M-8/4	1,3	2,3	690	1300
St 1.ZK 132	S-8/4	2,2	3,4	700	1400
	M-8/4	2,7	4,3	710	1450
St 1.ZK 160	Mk-8/4	4	5,5	710	1440
	M-8/4	4,6	7,3	712	1440
St 1.ZK 180	L-8/4	6,8	11	712	1440
	L-8/4	11	15	712	1455
St 1.ZK 200	L-8/4	15	20	725	1470
St 1.ZK 225	S-8/4	18	24	735	1480
	M-8/4	22	28	735	1480
St 1.ZK 250	M-8/4	30	42	740	1480

With two separate windings Y/Y

1000/1500 min^{-1}

Type		Output [kW]		n [min^{-1}]	
		2p=6	2p=4	2p=6	2p=4
St 1.ZK 80	A-6/4	0,22	0,32	940	1415
	B-6/4	0,26	0,4	940	1440
St 1.ZK 90	S-6/4	0,45	0,66	940	1440
	L-6/4	0,6	0,9	940	1440
St 1.ZK 100	L-6/4	0,9	1,3	940	1440
St 1.ZK 112	M-6/4	1,2	1,8	940	1440
St 1.ZK 132	S-6/4	1,7	2,7	960	1440
	M-6/4	2,4	3,7	965	1450
St 1.ZK 160	M-6/4	3,8	5,7	965	1460
	L-6/4	5,5	8	970	1460
St 1.ZK 180	M-6/4	7,5	11	970	1480
	L-6/4	9	13	970	1470
St 1.ZK 200	L-6/4	13	19	980	1470
St 1.ZK 225	S-6/4	19	23	985	1480
	M-6/4	23	27	985	1480
St 1.ZK 250	M-6/4	27	32	985	1485

750/1000 min^{-1}

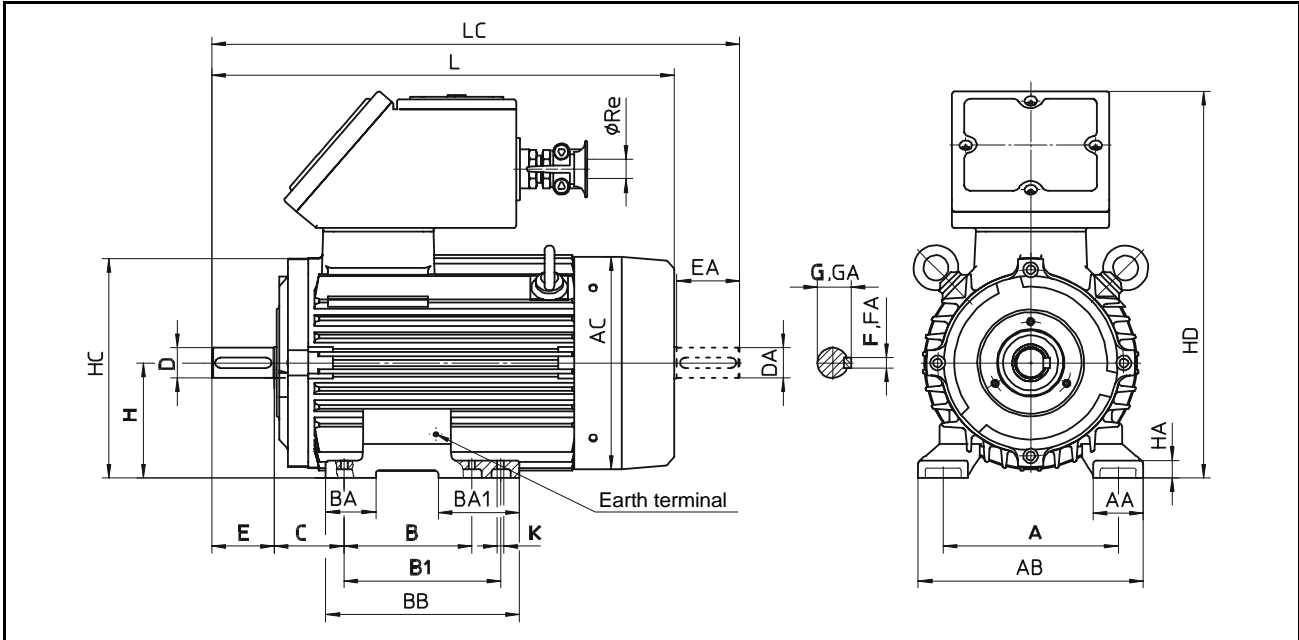
Type		Output [kW]		n [min^{-1}]	
		2p=8	2p=6	2p=8	2p=6
St 1.ZK 90	S-8/6	0,35	0,45	690	945
	L-8/6	0,45	0,6	690	945
St 1.ZK 100	L-8/6	0,6	0,8	680	940
	Ld-8/6	0,75	0,9	700	960
St 1.ZK 112	M-8/6	0,9	1,2	700	950
St 1.ZK 132	S-8/6	1,4	2	710	960
	M-8/6	2,2	3	715	970
St 1.ZK 160	M-8/6	3,5	5	715	970
	L-8/6	5	7	715	970
St 1.ZK 180	L-8/6	7	9,5	730	980
St 1.ZK 200	L-8/6	10	13	730	980
St 1.ZK 225	L-8/6	13	16	730	985
	S-8/6	17	22	735	985
St 1.ZK 250	M-8/6	22	30	735	985

It is important to indicate supply voltage and frequency when ordering certain motor designs.

3.5 OUTLINE DRAWINGS

Type: **St 1.ZK**
 Protection: **EExd I, EExde II B**
 Temperature class: **T1 - T4**

IM B3 - IM 1001



Type	Pole	A	AA	AB	AC	B	B1	BA	BA1	BB	C	D	DA	E	EA	F	FA	GA	GC	H	HA	HC	HD	K	L	LC	Cable gland with trumpet		
St 1.ZK 71	2,4,6,8	112	34	142	140	90	-	-	-	114	45	14	14	30	30	5	5	16	16	71	8	142	242	7	278	310	Re 16		
St 1.ZK 80	2,4,6,8	125	38	155	154	100	-	-	-	130	50	19	19	40	40	6	6	21,5	21,5	80	9	157	262	10	316	358	Re 16		
St 1.ZK 90	S	2,4,6,8	140	40	180	170	100	-	-	40	65	155	56	24	24	50	50	8	8	27	27	90	12	174	306	10	370	422	Re 16
	L	2,4,6,8	160	46	204	193	140	-	50	50	175	63	28	28	60	60	8	8	31	31	100	14	195	326	12	432	494	Re 16	
St 1.ZK 100	Ld	4,6,8	160	46	204	193	140	-	50	50	175	63	28	28	60	60	8	8	31	31	100	14	195	326	12	432	494	Re 16	
St 1.ZK 112	M	2,4,6,8	190	46	236	216	140	-	50	50	175	70	28	28	60	60	8	8	31	31	112	16	218	345	12	435	497	Re 21	
St 1.ZK 132	Sk	2	216	55	271	247	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Re 21	
	S	2,4,6,8	216	55	271	247	140	-	-	50	93	218	89	38	38	80	80	10	10	41	41	132	20	250	378	12	535	617	Re 21
	Mk	6	216	55	271	247	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Re 21	
	M	4,6,8	216	55	271	247	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Re 21	

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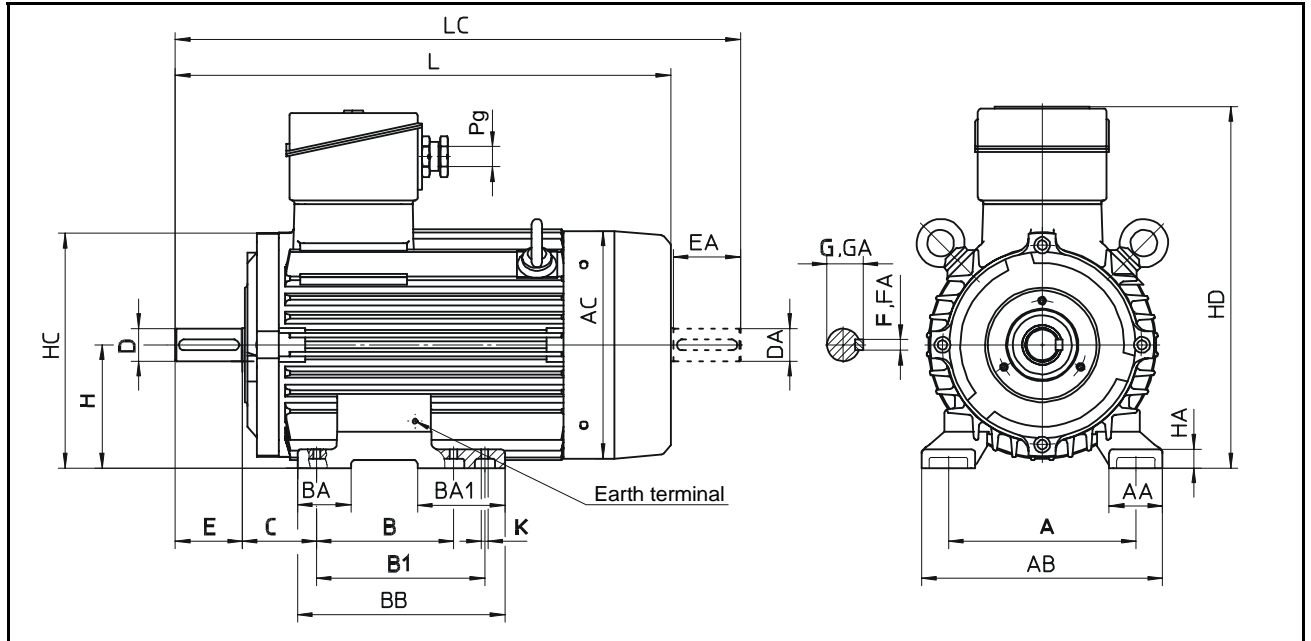
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Mounting dimensions given in bold figures are obligatory in the sense of IEC recommendations.

Type: **St 1.ZK**
 Protection: **EExd II C**
 Temperature class: **T1 - T4**

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IM B3 - IM 1001



Type	Pole	A	AA	AB	AC	B	B1	BA	BA1	BB	C	D	DA	E	EA	F	FA	GA	GC	H	HA	HC	HD	K	L	LC	Cable gland		
St 1.ZK 71	2,4,6,8	112	34	142	140	90	-	-	-	114	45	14	14	30	30	5	5	16	16	71	8	142	218	7	278	310	Pg 13,5		
St 1.ZK 80	2,4,6,8	125	38	155	154	100	-	-	-	130	50	19	19	40	40	6	6	21,5	21,5	80	9	157	236	10	316	358	Pg 13,5		
St 1.ZK 90	S	2,4,6,8	140	40	180	170	100	-	-	40	65	155	56	24	24	50	50	8	8	27	27	90	12	174	282	10	370	422	Pg 13,5
	L	2,4,6,8	140	40	180	170	125	-	-	40	65	155	56	24	24	50	50	8	8	27	27	90	12	174	282	10	370	422	Pg 13,5
St 1.ZK 100	L	2,4,6,8	160	46	204	193	140	-	50	50	175	63	28	28	60	60	8	8	31	31	100	14	195	298	12	432	494	Pg 13,5	
	Ld	4,6,8	160	46	204	193	140	-	50	50	175	63	28	28	60	60	8	8	31	31	100	14	195	298	12	432	494	Pg 13,5	
St 1.ZK 112	M	2,4,6,8	190	46	236	216	140	-	50	50	175	70	28	28	60	60	8	8	31	31	112	16	218	327	12	435	497	Pg 21	
St 1.ZK 132	Sk	2	216	55	271	247	140	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
	S	2,4,6,8	216	55	271	247	140	-	50	93	218	89	38	38	80	80	10	10	41	41	132	20	250	360	12	535	617	Pg 21	
	Mk	6	216	55	271	247	140	-	50	93	218	89	38	38	80	80	10	10	41	41	132	20	250	360	12	535	617	Pg 21	
	M	4,6,8	216	55	271	247	178	-	50	93	218	89	38	38	80	80	10	10	41	41	132	20	250	360	12	535	617	Pg 21	

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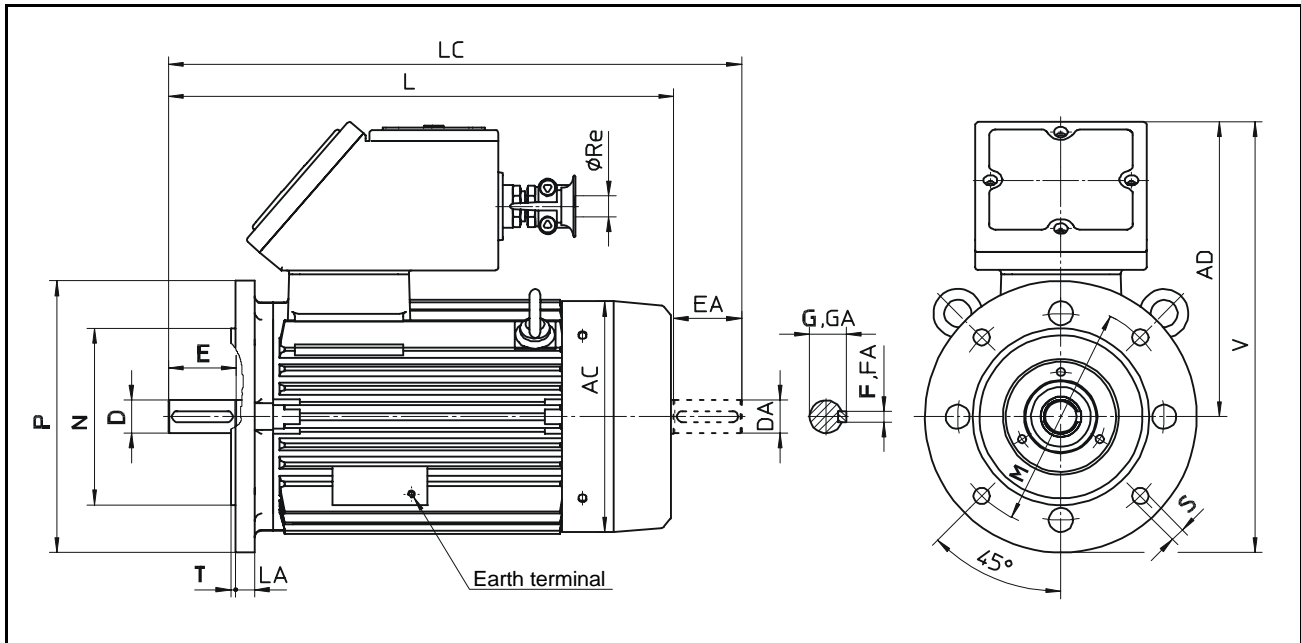
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Type: **St 1.ZK**
 Protection: **EExd I, EExde II B**
 Temperature class: **T1 - T4**

IM B5 - IM 3001



Type	Pole	Flange	AC	AD	D	DA	E	EA	F	FA	GA	GC	L	LA	LC	M	N	P	S	Num.of holes	T	V	Cable gland with trumpet	
St 1.ZK 71	2,4,6,8	FF 130	140	171	14	14	30	30	5	5	16	16	278	12	310	130	110	160	10	4	3,5	251	Re 16	
St 1.ZK 80	2,4,6,8	FF165	154	182	19	19	40	40	6	6	21,5	21,5	316	14	358	165	130	200	12	4	3,5	282	Re 16	
St 1.ZK 90	S	2,4,6,8	FF 165	170	216	24	24	50	50	8	8	27	27	370	16	422	165	130	200	12	4	3,5	316	Re 16
	L																							
St 1.ZK 100	L	2,4,6,8	FF 215	193	226	28	28	60	60	8	8	31	31	432	18	494	215	180	250	15	4	4	351	Re 16
	Ld	4,6,8																						
St 1.ZK 112	M	2,4,6,8	FF 215	216	233	28	28	60	60	8	8	31	31	435	18	497	215	180	250	15	4	4	358	Re 21
St 1.ZK 132	Sk	2	FF 265	247	246	38	38	80	80	10	10	41	41	535	18	617	265	230	300	15	4	4	396	Re 21
	S	2,4,6,8																						
	Mk	6																						
	M	4,6,8																						

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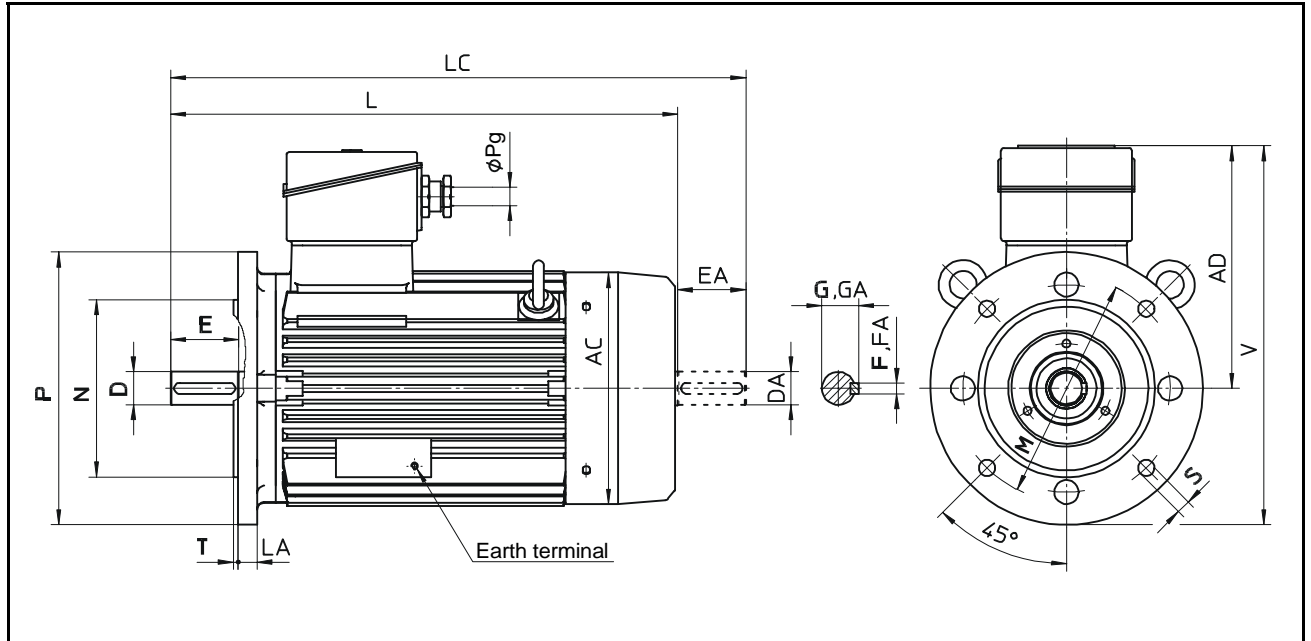
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Type: **St 1.ZK**
 Protection: **EExde II C**
 Temperature class: **T1 - T4**

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IM B5 - IM 3001



Type	Pole	Flange	AC	AD	D	DA	E	EA	F	FA	GA	GC	L	LA	LC	M	N	P	S	Num.of holes	T	V	Cable gland	
St 1.ZK 71	2,4,6,8	FF 130	140	147	14	14	30	30	5	5	16	16	278	12	310	130	110	160	10	4	3,5	227	Pg 13,5	
St 1.ZK 80	2,4,6,8	FF165	154	156	19	19	40	40	6	6	21,5	21,5	316	14	358	165	130	200	12	4	3,5	256	Pg 13,5	
St 1.ZK 90	S	FF 165	170	192	24	24	50	50	8	8	27	27	370	16	422	165	130	200	12	4	3,5	292	Pg 13,5	
	L																							
St 1.ZK 100	L	2,4,6,8	FF 215	193	198	28	28	60	60	8	8	31	31	432	18	494	215	180	250	15	4	4	323	Pg 13,5
	Ld	4,6,8																						
St 1.ZK 112	M	2,4,6,8	FF 215	216	215	28	28	60	60	8	8	31	31	435	18	497	215	180	250	15	4	4	340	Pg 21
St 1.ZK 132	Sk	2	FF 265	247	228	38	38	80	80	10	10	41	41	535	18	617	265	230	300	15	4	4	378	Pg 21
	S	2,4,6,8																						
	Mk	6																						
	M	4,6,8																						

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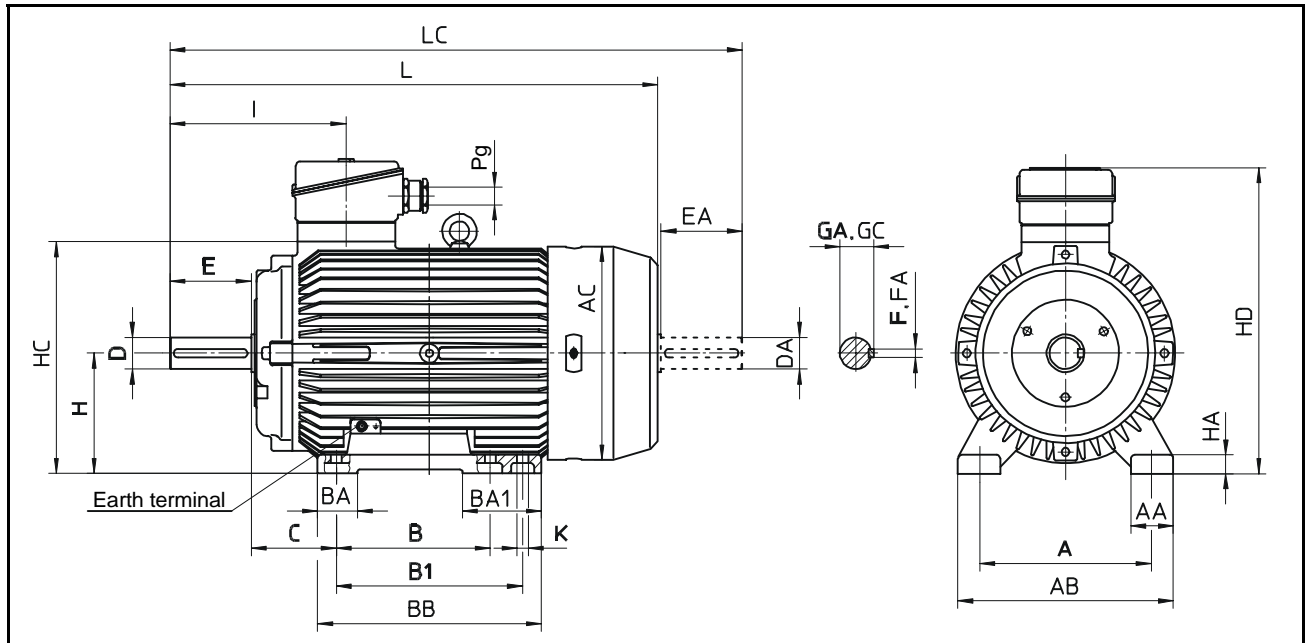
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Type: **St 1.ZK**
 Protection: **EExde II B**
 Temperature class: **T1 - T4**

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IM B3 - IM 1001



Type	Pole	A	AA	AB	AC	B	B1	BA	BA1	BB	C	D	DA	E	EA	F	FA	GA	GC	H	HA	HC	HD	I	K	L	LC	Cable gland	
St 1.ZK 160	Mk	2,8				210	-																						
	M	2,4,6,8	254	60	314	285		65	103	304	108	42	42	110	110	12	12	45	45	160	23	268	385	175	15	650	770		Pg 29
	L																												
St 1.ZK 180	M	2,4	279	70	349	323		55	92	334	121	48	48	110	110	14	14	51,5	51,5	180	28	338	455	192	15	706	826		Pg 29
	L	4,6,8																											
St 1.ZK 200	Lk	2,6	318	80	398	369		95	95	375	133	55	55	110	110	16	16	59	59	200	30	423	534	272	18	806	931		Pg 36
	L	2,4,6,8																											
St 1.ZK 225	S	4,8				286	-					60	60	140	140	18	18	64	64					264		840	995		Pg 36
	M	2	356	90	446	411		84	100	380	149	55	55	110	110	16	16	59	59	225	35	455	590	234	18	810	935		
		4,6,8											60	60	140	140	18	18	64	64				264		840	995		
St 1.ZK 250	M	2	406	96	506	474		95	133	430	168	60	60	140	140	18	18	64	64	250	40	543	723	340	24	920	1075		Pg 36
		4,6,8										65	65	140	140	18	18	69	69										
St 1.ZK 280	S	2				368	-					65	65			18	18	69	69										Pg 36
		4,6,8	457	110	567	510		110	150	500	190	75	75	140	140	20	20	79,5	79,5	280	45	598	784	340	24	1045	1200		
	M	2										65	65			18	18	69	69										
St 1.ZK 315	S	2				406	-					65	65	140	140	18	18	69	69					380		1150	1305		Pg 42
		4,6,8	508	125	633	562		120	170	550	216	80	80	170	170	22	22	85	85	315	50	690	887	410		1180	1365		
	M	2										65	65	140	140	18	18	69	69					380		1150	1305		
		4,6,8										80	80	170	170	22	22	85	85					410		1180	1365		

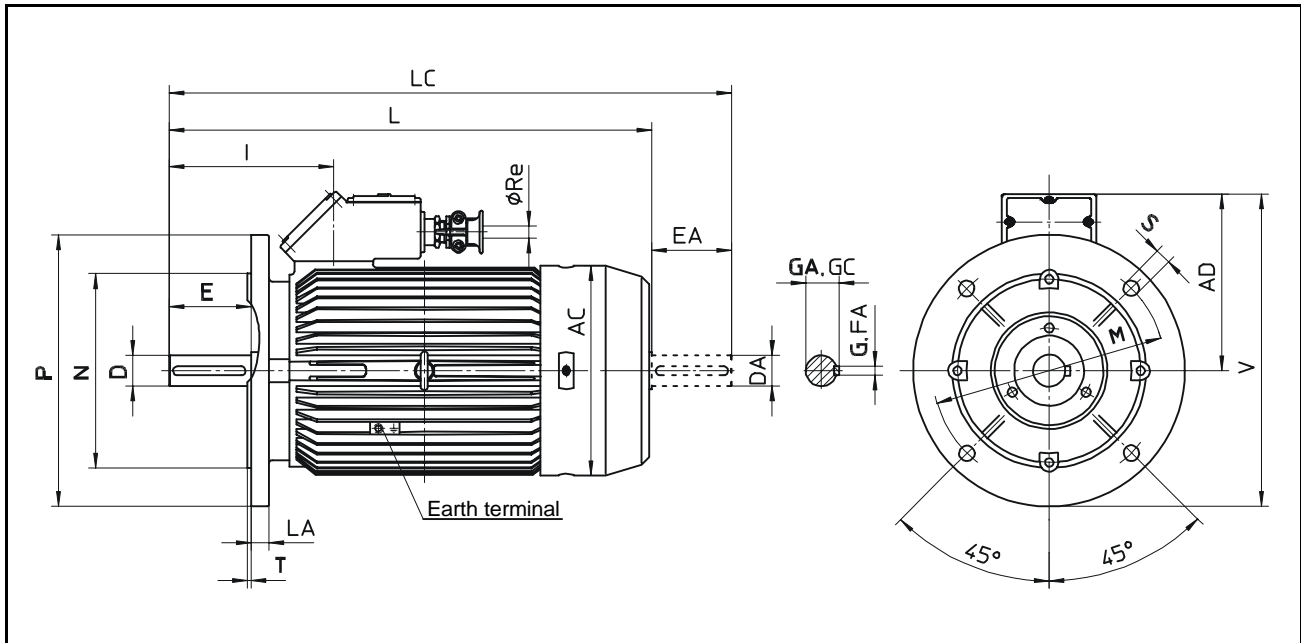
On a special request, motors of frame size **200** to **315** are also available in explosion-proof protection **EExd II C!**

On a special request, motors of frame size **160** to **315** are also available in temperature class **T5!**

Mounting dimensions given in bold figures are obligatory in the sense of IEC recommendations.

Type: **St 1.ZK**
 Protection: **EExd I, EExde II B**
 Temperature class: **T1 - T4**

IM B5 - IM 3001



Type	Pole	Flange	AC	AD	D	DA	E	EA	F	FA	GA	GC	I	L	LA	LC	M	N	P	S	Num.of holes	T	V	Cable gland with trumpet	
St 1.ZK 160	Mk	2,8	FF 300	285	225	42	42	110	110	12	12	45	45	175	670	23	790	300	250	350	19	4	5	400	Re 29
	M	2,4,6,8																							
	L																								
St 1.ZK 180	M	2,4	FF 300	323	275	48	48	110	110	14	14	51,5	51,5	192	726	23	846	300	250	350	19	4	5	450	Re29
	L	4,6,8																							
St 1.ZK 200	Lk	2,6	FF 350	369	334	55	55	110	110	16	16	59	59	272	826	23	951	350	300	400	19	4	5	534	Re 36
	L	2,4,6,8																							
St 1.ZK 225	S	4,8	FF 400	411	371	60	60	140	140	18	18	64	64	264	860	23	1015	400	350	450	18	8	5	596	Re 36
	M	2																							
St 1.ZK 250	M	2	FF 500	474	473	60	60	140	140	18	18	64	64	340	940	25	1095	500	450	550	19	8	5	748	Re 36
		4,6,8																							
St 1.ZK 280	S	2	FF 500	510	504	65	65	140	140	18	18	69	69	340	1065	25	1220	500	450	550	19	8	5	779	Re 36
		4,6,8																							
	M	2				65	65	140	140	18	18	69	69	340	1065	25	1220								
St 1.ZK 315	S	2	FF 600	562	572	65	65	140	140	18	18	69	69	380	1170	25	1325	600	550	660	24	8	6	902	Re 42
		4,6,8																							
	M	2				65	65	140	140	18	18	69	69	380	1170	1325									
		4,6,8				80	80	170	170	22	22	85	85	410	1200	1385									

On a special request, motors of frame size **200** to **315** are also available in explosion-proof protection **EExd II C!**

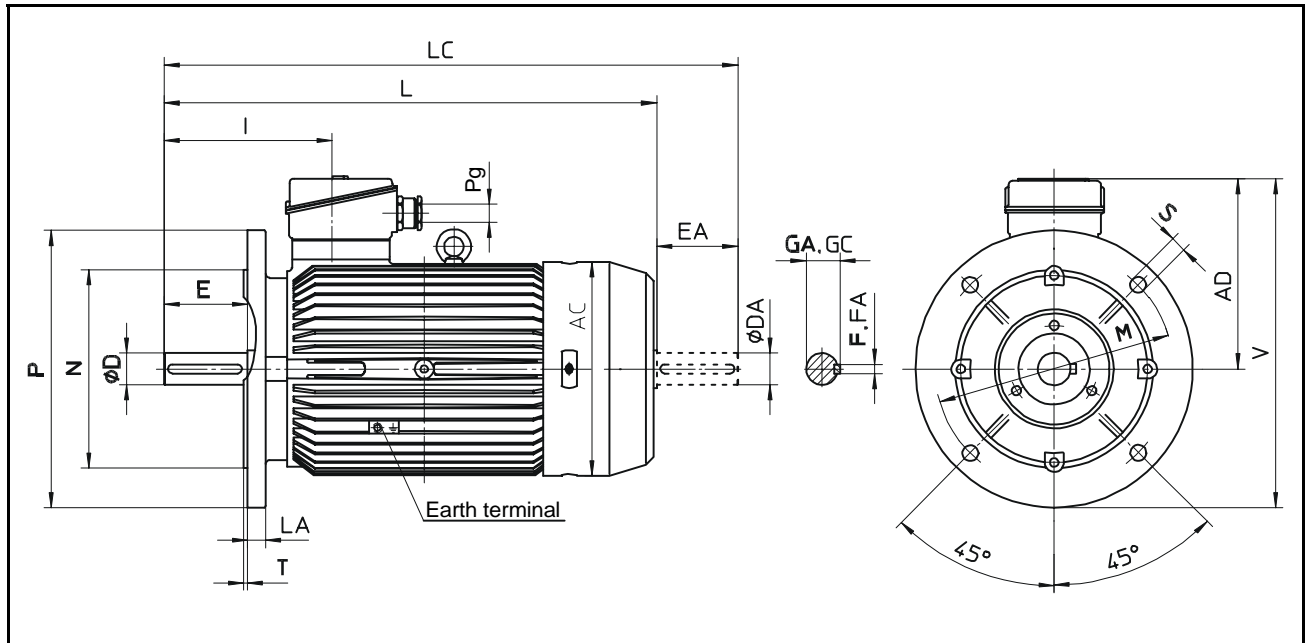
On a special request, motors of frame size **160** to **315** are also available in temperature class **T5!**

Mounting dimensions given in bold figures are obligatory in the sense of IEC recommendations.

Type: **St 1.ZK**
 Protection: **EExde II B**
 Temperature class: **T1 - T4**

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IM B5 - IM 3001



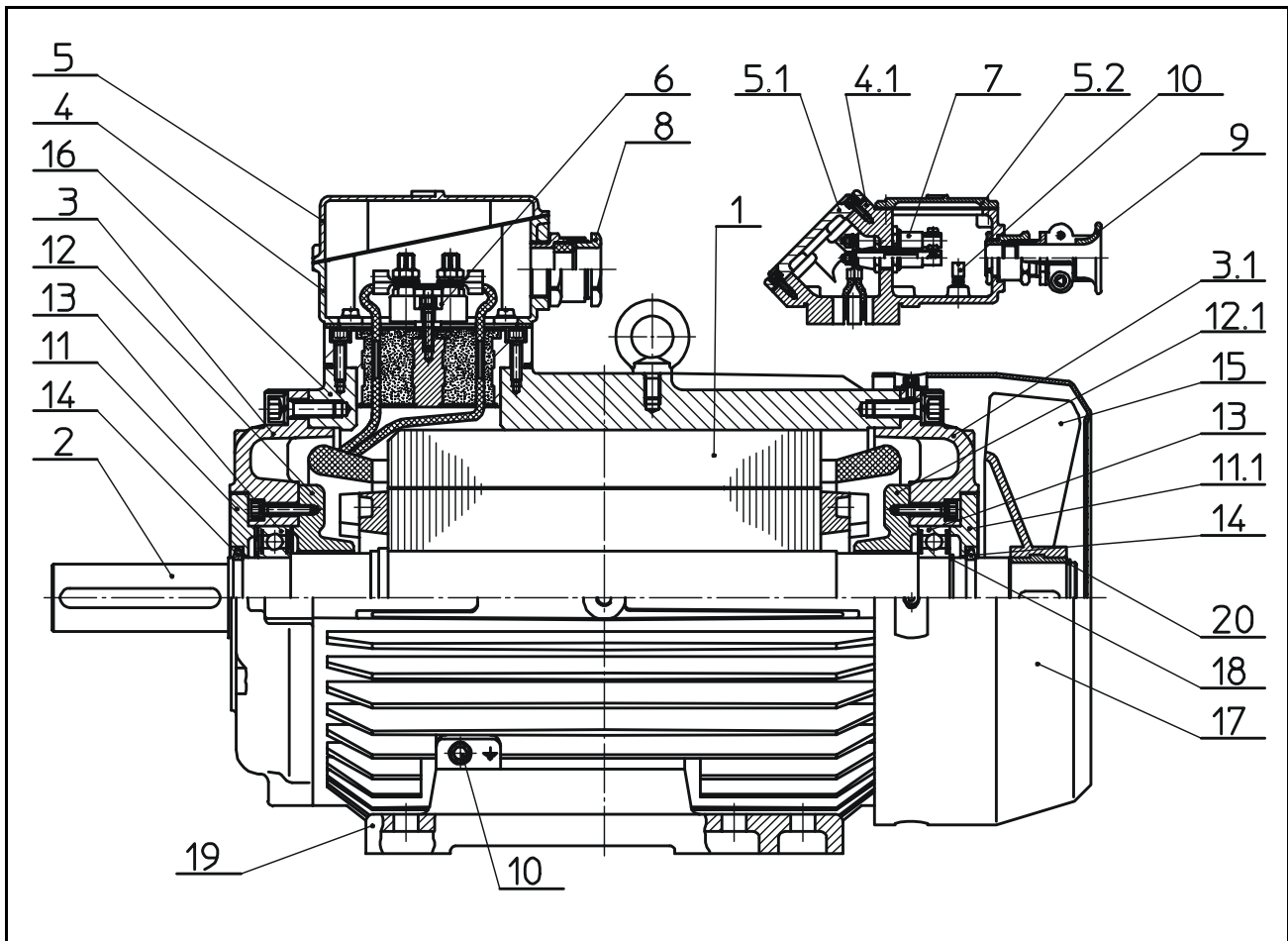
Type	Pole	Flange	AC	AD	D	DA	E	EA	F	FA	GA	GC	I	L	LA	LC	M	N	P	S	Num.of holes	T	V	Cable gland												
St 1.ZK 160	Mk	2,8	FF 300	285	225	42	42	110	110	12	12	45	45	175	650	23	770	300	250	350	19	4	5	400	Pg 29											
	M	2,4,6,8																																		
	L																																			
St 1.ZK 180	M	2,4	FF 300	323	275	48	48	110	110	14	14	51,5	51,5	192	706	23	826	300	250	350	19	4	5	450	Pg 29											
	L	4,6,8																																		
St 1.ZK 200	Lk	2,6	FF 350	369	334	55	55	110	110	16	16	59	59	272	806	23	931	350	300	400	19	4	5	534	Pg 36											
	L	2,4,6,8																																		
St 1.ZK 225	S	4,8	FF 400	411	371	60	60	140	140	18	18	64	64	264	860	23	995	400	350	450	18	8	5	596	Pg 36											
	M	2																								55	55	110	110	16	16	59	59	234	810	935
		4,6,8																								60	60	140	140	18	18	64	64	264	860	995
St 1.ZK 250	M	2	FF 500	474	473	60	60	140	140	18	18	64	64	340	940	25	1075	500	450	550	19	8	5	748	Pg 36											
		4,6,8																								65	65	140	140	18	18	69	69	340	940	1075
St 1.ZK 280	S	2	FF 500	510	504	65	65	140	140	18	18	69	69	340	1065	25	1200	500	450	550	19	8	5	779	Pg 36											
		4,6,8																								75	75	20	20	79,5	79,5					
	M	2				65	65			18	18	69	69																							
		4,6,8				75	75			20	20	79,5	79,5																							
St 1.ZK 315	S	2	FF 600	562	572	65	65	140	140	18	18	69	69	380	1170	25	1305	600	550	660	24	8	6	902	Pg 42											
		4,6,8																								80	80	22	22	85	85	410	1200			
	M	2				65	65			18	18	69	69	380	1170																					
		4,6,8				80	80			22	22	85	85	410	1200																					

On a special request, motors of frame size **200 to 315** are also available in explosion-proof protection **EExd II C!**

On a special request, motors of frame size **160 to 315** are also available in temperature class **T5!**

Mounting dimensions given in bold figures are obligatory in the sense of IEC recommendations.

3.6 PARTS





ITEM	DESCRIPTION
1.	STATOR
2.	ROTOR
3.	STATOR COVER - DRIVE SIDE
3.1	STATOR COVER - FAN SIDE
4.	TERMINAL BOX FRAME
4.1	TERMINAL BOX FRAME
5.	TERMINAL BOX COVER
5.1	TERMINAL BOX COVER
5.2	TERMINAL BOX COVER
6.	TERMINAL BOARD WITH ACCESSORIES
7.	FLAMEPROOF BUSHING
8.	CABLE GLAND
9.	CABLE GLAND WITH TRUMPET
10.	EARTH TERMINAL
11.	BEARING COVER, EXTERNAL - DRIVE SIDE
11.1	BEARING COVER, EXTERNAL - FAN SIDE
12.	BEARING COVER, INTERNAL - DRIVE SIDE
12.1	BEARING COVER, INTERNAL - FAN SIDE
13.	BEARING
14.	SHAFT SEAL
15.	FAN
16.	INTERPLATE OF TERMINAL BOX
17.	FAN COVER
18.	CIRCLIP
19.	FOOT
20.	CIRCLIP

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