Three-phase asynchronous motors for low voltage with squirrel-cage rotor

with EU efficiency classification

we get things moving

VEM

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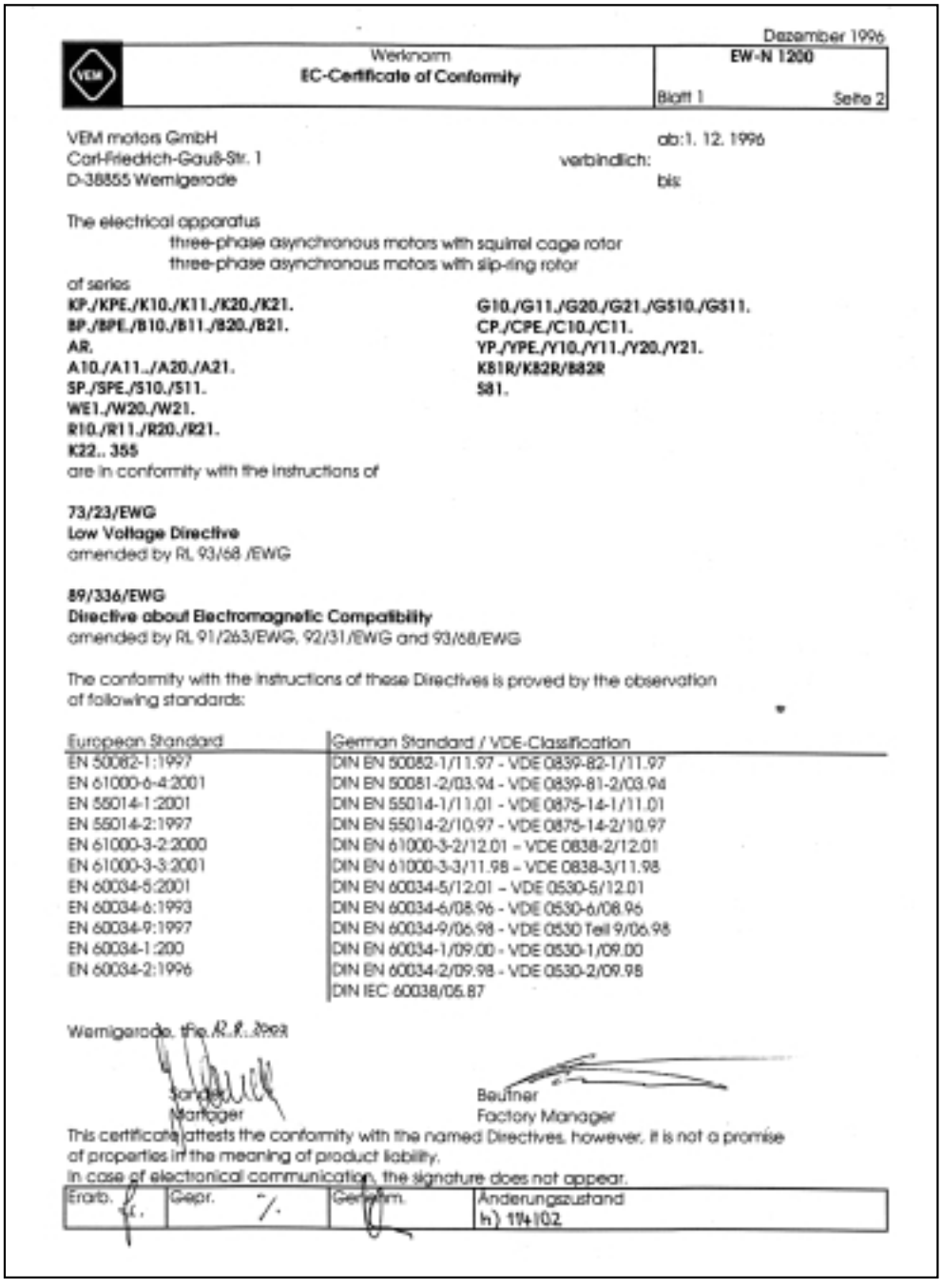
Introduction

Electrical drives in their many variations are now in use in every branch of industry. In most processes, they determine by virtue of their characteristics the economy of production. The three-phase asynchronous motors for low voltage from VEM motors GmbH meet the needs of operators with the regard to all-round versatility, superior performance parameters, environmental compatibility and high standard of reliability. VEM motors are designed for the whole European market and offer

- economical performance due to high motor efficiencies
- versatility and reduction of stock due to series version in IP 55 degree of protection (higher degrees of protection up to IP 66 on request)
- optional terminal box position right / on the top / left
- increased lifetime, reliability and thermal overload capacity by series version insulation class F with thermal reserve (special version insulation class H on request)
- environmental acceptability due to use of a low-noise and bi-directional ventilation system
- supply option complying with Eastern European standards
- performance option of a classic IEC/DIN series and on request a progressive one based on the IEC 72 for attachment dimensions and frame sizes
- attachment options for components as impulse sensors, tacho generators, brakes, speed sensors and forced-ventilation units for accomplishment with recent control methods



Dezember 1996

Werknorm
EC-Certificate of Conformity

EW-N 1200
Blatt 1 Seite 2

VEM motors GmbH
Carl-Friedrich-Gauß-Str. 1
D-38855 Wernigerode

ab: 1. 12. 1996
verbindlich:
bis:

The electrical apparatus
three-phase asynchronous motors with squirrel cage rotor
three-phase asynchronous motors with slip-ring rotor
of series

KP./KPE./K10./K11./K20./K21.
BP./BPE./B10./B11./B20./B21.
AR.
A10./A11../A20./A21.
SP./SPE./S10./S11.
WE1./W20./W21.
R10./R11./R20./R21.
K22.. 355
G10./G11./G20./G21./GS10./GS11.
CP./CPE./C10./C11.
YP./YPE./Y10./Y11./Y20./Y21.
KB1R/KB2R/BB2R
S81.

are in conformity with the instructions of

73/23/EWG
Low Voltage Directive
amended by RL 93/68 /EWG

89/336/EWG
Directive about Electromagnetic Compatibility
amended by RL 91/263/EWG, 92/31/EWG and 93/68/EWG

The conformity with the instructions of these Directives is proved by the observation of following standards:

European Standard	German Standard / VDE-Classification
EN 50082-1:1997	DIN EN 50082-1/11.97 - VDE 0839-82-1/11.97
EN 61000-6-4:2001	DIN EN 50081-2/03.94 - VDE 0839-81-2/03.94
EN 55014-1:2001	DIN EN 55014-1/11.01 - VDE 0875-14-1/11.01
EN 55014-2:1997	DIN EN 55014-2/10.97 - VDE 0875-14-2/10.97
EN 61000-3-2:2000	DIN EN 61000-3-2/12.01 – VDE 0838-2/12.01
EN 61000-3-3:2001	DIN EN 61000-3-3/11.98 – VDE 0838-3/11.98
EN 60034-5:2001	DIN EN 60034-5/12.01 – VDE 0530-5/12.01
EN 60034-6:1993	DIN EN 60034-6/08.96 - VDE 0530-6/08.96
EN 60034-9:1997	DIN EN 60034-9/06.98 - VDE 0530 Teil 9/06.98
EN 60034-1:200	DIN EN 60034-1/09.00 - VDE 0530-1/09.00
EN 60034-2:1996	DIN EN 60034-2/09.98 - VDE 0530-2/09.98
	DIN IEC 60038/06.87

Wernigerode, the 12. 8. 2003

Sandig
Manager

Beutner
Factory Manager

This certificate attests the conformity with the named Directives, however, it is not a promise of properties in the meaning of product liability.
In case of electronical communication, the signature does not appear.

Erarb.	Gepr.	Genehm.	Änderungszustand
			h) 114102

Standards and regulation

The motors comply with the relevant standards and regulations, particularly with the following:

Title	DIN EN / DIN VDE	IEC
Rotating electrical machines, rating and performance	DIN EN 60034-1	IEC 34-1 IEC 85
Rotating electrical machines, methods for determining losses and efficiency	DIN EN 60034-2	IEC 34-2
Totally enclosed three-phase induction motors with squirrel-cage, type IM B3	DIN 42673	(IEC 72)
Totally enclosed three-phase induction motors with squirrel-cage, type IM B5, IM B35 and IM B14	DIN 42677	(IEC 72)
Rotating electrical machines, terminal markings and direction of rotation	DIN VDE 0530 p. 8	IEC 34-8
Rotating electrical machines, symbols for types of construction and mounting arrangements	DIN EN 60034-7	IEC 34-7
Rotating electrical machines, built-in thermal protection	-	IEC 34-11
Rotating electrical machines, methods of cooling	DIN EN 60034-6	IEC 34-6
Rotating electrical machines, classification of degrees of protection provided by enclosures	DIN EN 60034-5	IEC 34-5
Rotating electrical machines, mechanical vibrations of certain machines with shaft heights 56 mm and higher	DIN EN 60034-14	IEC 34-14
Cylindrical shaft ends for rotating electrical machines	DIN 748 p. 3	IEC 72
Rotating electrical machines, noise limits	DIN EN 60034-9	IEC 34-9
Rotating electrical machines, starting performance of single-speed three-phase cage induction motors for voltages up to 660 V, 50 Hz	DIN EN 60034-12	IEC 34-12
IEC standard voltages	DIN IEC 38	IEC 38

In addition, VEM motors comply with various foreign regulations which have been adapted to IEC 34-1

NF C 51	France
ÖVE M10	Austria
SS 426 0101	Sweden
SEV 3009	Switzerland
NBNC 51-101	Belgium
CEI 2-3, V1	Italy
NEK-IEC 34-1	Norway
BS 5000/BS 4999	Great Britain

and the Series K11R / K21R are also tested and available according to the regulations of the Classification Authorities

Germanischer Lloyd
Det Norske Veritas
American Bureau of Shipping
Russian Register
Lloyd's Register of Shipping
Bureau Veritas

With these standards and regulations, the following limits for temperature rise are valid:

Regulations	Temperature of cooling air	Permissible limits of temperature rise in K (measured by resistance method) Insulation class				
	°C	A	E	B	F	H
DIN EN 60034-1/ 02.99	40	60	75	80	105	125
IEC 34-1	40	60	75	80	105	125
United Kingdom BS	40	60	75	80	105	125
Italy CEI	40	60	70	80	105	125
Sweden SEN	40	60	70	80	105	125
Norway NEK	40	60	-	80	105	125
Belgium NBN	40	60	75	80	105	125
France NF	40	60	75	80	105	125
Schwizerland SEV	40	60	75	80	105	125
Germanischer Lloyd	45	55	70	75	100	120
American Bureau of Shipping	50	50	65	70	90	115
Bureau Veritas	50	50	65	70	90	110
Norske Veritas	45	50	65	70	90	115
Lloyd's Register	45	50	65	70	95	110
Russian Register	40/45	60	75	85	110	125

The series K11R and K21R are tested at VDE Prüf- und Zertifizierungsinstitut Offenbach and certified with VDE's EMC-label according to the certificate No. 94057 F.

Efficiency

The General Directorate Energy of the Europeam Commission and CEMEP as an association of the European motor and drive manufacturers have, in a Voluntary Agreement, settled to classify three-phase low voltage asynchronous motors according to their efficiency. The Agreement includes all two-pole and four-pole standard motors in the output range between 1 and 100 kW, and the classification is done by labelling the motors with one of the three classes eff1, eff2, eff3, where eff3 is attached to motors with nowadays usual efficiencies, eff2 belongs to motors with significantly increased efficiencies, and eff1 is a mark for high-efficiency motors. In the Agreement is specified, to mark the motors on the nameplate with the respective lass and to declare the respective classes for the motors in technical catalogues, moreover, in the catalogues must be specified data about efficiencies at partial loads. In the Agreement the DIN EN 60034-2 is expressly specified as the test procedure for determination of loss and efficiency. The mark for the efficiency classes is a Registered Trademark. VEM is among the subscribers of this Voluntary Agreement.

For the North American market, with respect to efficiency of three-phase low voltage motors the legal provisions of the so-called EPAct (or EPCA = Energy Policy and Conservation Act) are in force, by them, depending on the pole-number, are also minimum efficiencies determined (Table 12.10 of NEMA MG1 or Tables 2 and 3 of CSA C390). The output range of the affected motors is between 1 and 500 hp in NEMA MG1, and between 1 and 200 hp in CSA C 390. When classifying European motors according to the American rules, attention must be paid to the fact that the test procedure for determination of loss and efficiency is expressly specified with the Standard IEEE 112, and that, when using this procedure for determination of efficiencies, the results will have significant deviations from those of DIN EN 60034-2, i.e. it results in considerably lower efficiencies. Motors of the VEM series WE1R are certified by CSA according to CSA C390.

Bearings / Bearing lubrication

VEM motors are equipped with bearings from excellent manufacturers. The bearings have a nominal service life of at least 20,000 hours for maximum permissible load conditions. Without additional axial loading for coupling service the nominal bearing service life is 40,000 hours.

The versions

- fixed bearing N-end
- without fixed bearing
- permanent lubrication
- relubrication device
- heavy bearing arrangement D-end (for increased lateral forces)
- easy bearing arrangement

and the

- bearing schedules
- disc spring and wave washer schedule
- V-rings
- figures of bearing arrangements
- flat grease nipples

are shown in the bearing arrangement tables. Fixed bearing D-end possible on request.

Any grooved ball bearings have disc springs and wave washers, respectively, thus they are preloaded. This is not true for versions with cylindrical roller bearings.

The version "fixed bearing N-end" is possible for motors "without fixed bearing".

Motors with permanent lubrication are also available with a degree of protection IP 56.

Motor sizes 56 – 160 are fitted with life-lubricated bearings. For motors from size 180, depending on the useful life of grease, bearings must be regreased in good time so that the scheduled bearing service life is reached. Under normal operating conditions, the grease packing will last for 10,000 hours of operation with 2pole version and for 20,000 hours of operation with versions from 4poles upwards without being renewed. For motors fitted with relubrication device and working under normal operating conditions, the grease will last for 2,000 hours of operation with 2pole version and 4,000 hours of operation with 4- and mor-pole versions. The standard grease is a KE2R-40 type acc. to DIN 51825.

Use of cylindrical roller bearings

Using cylindrical roller bearings (heavy bearing arrangement), relatively high radial forces or masses can be accepted at the motor shaft end, e. g. belt drives, pinions or heavy-duty couplings.
The minimum radial force at the shaft end must be at least a quarter of the permissible one. Account must be taken of permissible shaft end loading. Both these values are found in the diagrams.

Important Note:
Radial forces below the minimum value can lead to bearing damage within a few hours. Test runs in no-load state are only permissible for a short period.

If the special minimum radial force cannot be met, we recommend the use of grooved ball bearings (easy bearing arrangement). Bearing change on request.

Vibration behaviour

The permissible vibration intensities of electric motors are specified in DIN EN 60034-14.

The vibration intensity stage N (normal) is achieved or bettered by VEM motors in the basic version. The vibration intensity stages R (reduced) and S (special) are available at extra carge and depending on the type. Please consult the manufacturer.

According DIN EN 60034-14 the following intensities are recommended:

Vibration intensity stages	Speed range rpm	Limit values of vibration velocity (mm/s) in frequency range 10 to 1000 Hz for sizes		
		80 – 112	132 – 200	225 – 400
N (normal)	600 – 3600	1.8	2.8	3.5
R (reduced)	600 – 1800	0.71	1.12	1.8
	above 1800 – 3600	1.12	1.8	2.8
S (special)	600 – 1800	0.45	0.71	1.12
	above 1800 – 3600	0.71	1.12	1.8

All rotors are dynamically balanced with the half key inserted. This balancing is documented on rating plate with the letter H behind the motor number, balancing with full key on request. In that case, the code letter behind the motor number will be F.

Noise behaviour

Noise measurement is carried out according to DIN EN 23741/ 23742 at design output, design voltage and design frequency. In accordance with DIN EN 60034-9, the spatial mean value of the measurement area sound pressure level LpA measured at a distance of 1 m from the machine outline is stated as noise intensity in dB (A).

The A-sound power level L_{WA} across the measurement area dimension L_S (d = 1 m) is also quoted with

$$L_{WA} = L_{pA} + L_S \text{ (dB)}$$

The measurement area dimensions are independent from the machine geometry and are for

		L_S (dB)
size	63 - 132	12
	160 - 225	13
	250 - 315	14
	355	15

The tabular value +4 dB (A) applies as an approximate value for motors in 60 Hz version. Binding data for 60 Hz are available on request.

The noise value for the basic types are quoted in tabular form. For special versions please refer to the manufacturer.

Ambient temperature

All VEM motors in the basic version can be used at ambient temperatures from -35 °C up to +40 °C.

Overload capacity

In compliance with DIN EN 60034-1, all motors can be exposed to the following overload conditions:
- 1.5 times the rated current for 2 min.
- 1.6 times the rated torque for 15 s (1.5 times for $I_A/I_N < 4.5$)

Both conditions apply to design voltage and design frequency.

Motor protection

The following motor protection versions are available as an option:
- motor protection with PTC thermistor sensors in the stator winding
- bimetallic temperature sensor as NC contact or NO contact in the stator winding
- resistance thermometer for monitoring the winding or bearing temperature on request

Tolerances – Electrical parameters

As specified by DIN EN 60034-1/02.99 the following tolerances are permissible:

Efficiency (indirect calculation)	- 0.15 (1-η) at $P_N \leq 50$ kW - 0.1 (1-η) at $P_N > 50$ kW
Power factor	$\frac{1-\cos\varphi}{6}$ min. 0.02 max. 0.07
Slip (at rated load and operating temperature)	± 20 % $P_N \geq 1$ kW ± 30 % $P_N < 1$ kW
Starting current (in the planned starting circuit)	+ 20 % no restriction downwards
Starting torque	- 15 % and + 25 %
Pull-up torque	- 15 %
Pull-out torque	- 10 % (with the application of this tolerance M_K/M at least 1.6)
Moment of inertia	± 10 %
Noise level (sound pressure level)	+ 3 dB (A)

These tolerances are permissible for the values assured for three-phase asynchronous motors, taking the necessary manufacturing tolerances and materials variations of the raw materials used into account. The standard contains the following notes on this:

1. A guarantee for all or any of the values shown in the table is not mandatory. In tender the guaranteed value for which permissible deviations should apply must be expressly specified. The permissible variations must correspond to those stated in the table.

2. "Guarantee": In some countries, a distinction is drawn between guaranteed values and typical or declared values.

3. If a permissible deviation only applies in one direction, then the value in the other direction is not limited.

Tolerances – Mechanical parameters

Dimensional short sign acc. to DIN 42939	Meaning of dimensions	Fit or tolerance
a	Spacing of feet fixing holes in axial direction	± 1 mm
a_1	Diameter or width across corners of attachment flange	± 1 mm
b	Spacing of feet fixing holes across axial direction	± 1 mm
b_1	Diameter of flange spigot	up to diameter 230 mm j6 from diameter 250 mm h6
d, d_1	Diameter of shaft end (cylindrical)	up to diameter 48 mm k6 from diameter 55 mm m6
e_1	Pitch circle diameter of attachment flange	± 0.8 mm
f, g	Largest width of motor (without terminal box)	+ 2 %
h	Shaft height (lower edge foot to centre of shaft)	up to 250 mm -0,5 from 250 mm -1
k, k_1	Overall length of motor	+ 1 %
l	≤ Ø shaft end 55 mm ≥ Ø shaft end 60 mm	- 0.3 mm - 0.5 mm
p	Overall height (lower edge foot, housing or flange to highest point of motor)	+ 2 %
s, s_1	Diameter of fixing holes of foot or flange	+ 3 %
t, t_1	Lower edge of shaft end to upper edge key	+ 0.2 mm
u, u_1	Width of key	h9
w_1, w_2	Centre of first attachment hole to shaft end shoulder	± 3.0 mm
	Distance shaft shoulder – flange face, fix. bearing D-end	± 0.5 mm
	Distance shaft shoulder – flange face	± 3.0 mm
	Motor weight	- 5 up to +10 %

Three-phase motors with squirrel-cage rotor

with surface ventilation, mode of operation S1, continuous duty
insulation class F, degree of protection IP 55

Motor selection data with EU efficiency classification

Design point 400 V, 50 Hz

Type		P_B	n_B	EFF-	$\eta_{4/4B}$	$\eta_{3/4B}$	$\cos \varphi_B$	I_B 400 V	I_A/I_B	M_A/M_B	M_S/M_B	M_K/M_B	J	m
		kW	rpm	-	%	%	-	A	-	-	-	-	kgm^2	kg
Synchronous speed 3000 rpm – 2-pole version														
K21R 56 K2		0.09	2865		70.0	67.5	0.74	0.25	4.9	2.3	2.3	2.8	0.00013	4.4
K21R 56 G2		0.12	2830		70.3	69.6	0.77	0.32	4.5	2.1	2.1	2.3	0.00013	4.5
K21R 63 K2	K20R 56 K2	0.18	2790		67.1	63.1	0.76	0.50	4.1	1.9	1.9	2.2	0.00013	4.9
K21R 63 G2	K20R 56 G2	0.25	2800		68.1	65.6	0.72	0.74	4.2	2.2	2.2	2.4	0.00015	5.2
K21R 71 K2	K20R 63 K2	0.37	2780		71.5	69.7	0.79	0.94	4.4	2.1	2.1	2.3	0.00025	6.7
K21R 71 G2	K20R 63 G2	0.55	2815		74.3	72.7	0.81	1.38	5.1	2.3	2.1	2.6	0.00032	7.6
K21R 80 K2	K20R 71 K2	0.75	2825		77.5	77.3	0.81	1.72	5.9	2.4	2.4	2.4	0.00057	10.7
K21R 80 G2	K20R 71 G2	1.1	2835	2	77.8	77.4	0.80	2.55	6.0	2.4	2.3	2.6	0.00072	11.5
K21R 90 S2	K20R 80 K2	1.5	2850	2	80.4	80.2	0.80	3.35	7.0	2.5	2.5	2.8	0.00132	16.0
K21R 90 L2	K20R 80 G2	2.2	2850	2	82.0	81.5	0.85	4.55	7.5	2.8	2.3	2.9	0.0017	19.0
K21R 100 L2	K20R 90 L2	3.0	2865	2	83.4	84.2	0.84	6.15	7.0	2.4	2.4	2.8	0.00275	25.0
K21R 112 M2	K20R 100 S2	4.0	2900	2	84.4	84.7	0.81	8.4	7.0	2.2	2.1	2.9	0.0045	32
K21R 132 S2 T	K20R 100 L2	5.5	2890	2	86.3	86.6	0.84	11	7.5	2.4	2.2	3.0	0.0055	40
K21R 132 SX2	K20R 112 M2	7.5	2900	2	87.0	87.0	0.86	14.5	6.6	1.8	1.3	2.5	0.0110	57
K21R 160 M2	K20R 132 M2	11.0	2900	2	88.5	88.5	0.90	20	7.0	2.4	2.0	3.0	0.0258	81
K21R 160 MX2	K20R 160 S2	15.0	2930	2	89.4	89.4	0.90	27	7.1	2.2	1.7	2.9	0.0575	118
K21R 160 L2	K20R 160 M2	18.5	2920	2	90.5	89.5	0.92	32	7.2	2.1	1.6	2.8	0.0675	134
K21R 180 M2	K20R 180 S2	22	2935	2	91.8	91.0	0.92	37.5	6.8	1.7	1.4	2.6	0.105	165
K21R 200 L2	K20R 180 M2	30	2940	2	92.8	92.0	0.92	50.5	7.3	2.0	1.6	2.9	0.128	195
K21R 200 LX2	K20R 200 M2	37	2940	2	93.0	92.0	0.90	64	7.0	1.8	1.3	2.4	0.193	255
K21R 225 M2	K20R 200 L2	45	2940	1	93.7	93.0	0.91	76	7.5	1.8	1.4	2.7	0.220	290
K21R 250 M2	K20R 225 M2	55	2955	2	93.7	92.5	0.91	93	7.5	2.0	1.5	2.6	0.375	360
K21R 280 S2	K20R 250 S2	75	2970	1	94.6	93.5	0.92	124	7.5	2.0	1.6	2.6	0.650	490
K21R 280 M2	K20R 250 M2	90	2970	2	94.7	94.2	0.91	151	8.5	2.2	1.8	2.8	0.675	510
K21R 315 S2	K20R 280 S2	110	2975		95.4	94.5	0.91	183	8.5	1.5	1.3	2.5	1.21	720
K21R 315 M2	K20R 280 M2	132	2975		95.4	94.5	0.91	219	8.5	2.0	1.8	2.7	1.44	800
K21R 315 MX2	K20R 315 S2	160	2975		96.0	95.0	0.93	259	8.5	2.0	1.6	2.6	1.76	980
K21R 315 MY2	K20R 315 M2	200	2970		96.0	95.2	0.92	327	8.2	2.6	2.0	2.6	2.82	1170
K21R 315 L2	K20R 315 L2	250	2973		96.1	95.2	0.93	404	7.3	2.1	1.4	2.0	3.66	1460
K21R 315 LX2	K20R 315 LX2	315	2975		96.7	95.5	0.92	511	7.4	2.4	1.4	2.0	4.43	1630
K22R 355 MY2		315	2988		96.8	96.6	0.88	534	8.6	1.3	1.0	3.0	4.10	1900
K22R 355 M2		355	2980		96.5	96.5	0.91	583	7.3	1.3	1.0	2.3	4.20	2000
K22R 355 MX2		400	2985		96.8	96.7	0.90	663	8.5	1.9	1.3	3.2	5.50	2200
K22R 355 LY2		450	2983		96.9	96.7	0.92	729	7.2	1.3	1.0	2.4	7.10	2400
K22R 355 L2		500	2985		97.2	97	0.92	807	8.2	1.8	0.9	2.6	7.10	2400

Three-phase motors with squirrel-cage rotor

with surface ventilation, mode of operation S1, continuous duty
insulation class F, degree of protection IP 55

Motor selection data with EU efficiency classification

Designpoint 400 V, 50 Hz

Type		P_B	n_B	EFF-	$\eta_{4/4B}$	$\eta_{3/4B}$	cos φ_B	I_B 400 V	I_A/I_B	M_A/M_B	M_S/M_B	M_K/M_B	J	m
		kW	rpm	-	%	%	-	A	-	-	-	-	kgm²	kg
Synchronous speed 1500 rpm – 4-pole version														
K21R 56 K4		0.06	1410		60.5	56.8	0.60	0.24	3.1	2.3	2.3	2.7	0.00019	4.3
K21R 56 G4		0.09	1375		62.0	61	0.68	0.31	3.2	1.9	1.9	2.2	0.00019	4.4
K21R 63 K4	K20R 56 K4	0.12	1370		57.5	56.7	0.68	0.44	3.2	1.9	1.8	2.2	0.00019	4.8
K21R 63 G4	K20R 56 G4	0.18	1360		61.0	56.5	0.66	0.65	3.3	2.0	2.0	2.3	0.00024	5.2
K21R 71 K4	K20R 63 K4	0.25	1385		64.6	62.3	0.72	0.78	3.6	1.8	1.8	2.1	0.00040	6.8
K21R 71 G4	K20R 63 G4	0.37	1370		67.8	66.9	0.74	1.06	3.8	2.0	2.0	2.2	0.00050	7.8
K21R 80 K4	K20R 71 K4	0.55	1400		71.5	69.3	0.69	1.60	4.1	2.1	2.0	2.3	0.00087	10.6
K21R 80 G4	K20R 71 G4	0.75	1400		73.5	70.8	0.70	2.10	4.6	2.2	2.1	2.3	0.00107	11.7
K21R 90 S4	K20R 80 K4	1.1	1410	2	76.6	75.3	0.79	2.62	5.5	2.3	2.2	2.5	0.00207	15.5
K21R 90 L4	K20R 80 G4	1.5	1400	2	78.8	77.9	0.81	3.40	5.5	2.5	2.4	2.6	0.00260	18.0
K21R 100 L4	K20R 90 L4	2.2	1410	2	81.0	80	0.76	5.15	6.0	3.0	2.7	3.1	0.00400	23.5
K21R 100 LX4	K20R 100 S4	3.0	1430	2	82.6	82.3	0.79	6.70	6.5	2.3	2.1	2.8	0.00725	30
K21R 112 M4	K20R 100 L4	4.0	1435	2	84.2	83.6	0.78	8.80	6.9	2.6	2.5	3.2	0.00900	37
K21R 132 S4 T	K20R 100 LX4	5.5	1425	2	85.7	85.3	0.77	11.8	6.3	2.5	2.4	2.9	0.01100	47
K21R 132 M4	K20R 132 S4	7.5	1450	2	87.0	86	0.84	15	6.0	2.0	1.7	2.9	0.0280	70
K21R 160 M4	K20R 132 M4	11.0	1450	2	88.4	88	0.85	21	6.8	2.2	1.9	3.3	0.0350	92
K21R 160 L4	K20R 160 S4	15.0	1465	2	89.4	89	0.86	28	7.3	2.5	2.0	3.0	0.0780	120
K21R 180 M4	K20R 160 M4	18.5	1460	2	90.0	89.5	0.86	34.5	6.8	2.5	2.0	2.9	0.0900	136
K21R 180 L4	K20R 180 S4	22	1465	2	90.5	90.5	0.84	42	6.5	2.0	1.8	2.6	0.1380	170
K21R 200 L4	K20R 180 M4	30	1465	2	91.5	91	0.85	55.5	7.0	2.0	1.7	2.4	0.1680	200
K21R 225 S4	K20R 200 M4	37	1470	2	92.5	91.5	0.86	67	7.0	2.0	1.7	2.5	0.2750	270
K21R 225 M4	K20R 200 L4	45	1470	2	93.0	92.5	0.86	81	7.0	2.0	1.7	2.5	0.3130	300
K21R 250 M4	K20R 225 M4	55	1475	2	93.5	93	0.86	98.5	7.0	2.2	1.7	2.3	0.5250	375
K21R 280 S4	K20R 250 S4	75	1480	2	94.1	93.5	0.86	134	7.0	2.0	1.7	2.2	0.9500	520
K21R 280 M4	K20R 250 M4	90	1480	2	94.6	93.5	0.86	160	7.0	2.1	1.6	2.2	1.10	580
K21R 315 S4	K20R 280 S4	110	1485		95.1	94.5	0.86	194	7.5	1.8	1.6	2.2	1.96	740
K21R 315 M4	K20R 280 M4	132	1485		95.1	94.5	0.86	233	7.0	1.8	1.5	2.2	2.27	840
K21R 315 MX4	K20R 315 S4	160	1480		95.0	94.8	0.87	279	7.0	1.8	1.5	2.0	2.73	1000
K21R 315 MY4	K20R 315 M4	200	1485		96.0	95	0.88	342	7.5	2.0	1.8	2.4	4.82	1200
K21R 315 L4	K20R 315 L4	250	1485		96.1	95	0.90	417	8.0	2.0	1.6	2.3	5.93	1510
K21R 315 LX4	K20R 315 LX4	315	1490		96.5	95.5	0.88	535	8.6	1.9	1.5	2.5	6.82	1630
K22R 355 MY4		315	1492		95.6	95.5	0.85	560	7.1	1.4	1.0	2.9	5.60	1950
K22R 355 M4		355	1490		96.8	96.5	0.84	630	8.1	1.8	1.0	3.1	7.9	2150
K22R 355 MX4		400	1494		96.8	96.7	0.84	710	8.6	1.3	1.0	3.0	9.5	2400
K22R 355 LY4		450	1490		96.8	96.7	0.82	818	8.0	1.2	1.0	3.0	10.0	2500
K22R 355 L4		500	1490		96.7	96.4	0.79	945	7.9	1.1	1.0	3.0	10.0	2500

Three-phase motors with squirrel-cage rotor

with surface ventilation, mode of operation S1, continuous duty
insulation class F, degree of protection IP 55

Motor selection data

Design point 400 V, 50 Hz

Type		P_B	n_B	EFF-	$\eta_{4/4B}$	$\eta_{3/4B}$	cos φ_B	I_B 400 V	I_A/I_B	M_A/M_B	M_S/M_B	M_K/M_B	J	m
		kW	rpm	-	%	%	-	A	-	-	-	-	kgm²	kg
Synchronous speed 1000 rpm – 6-pole version														
K21R 63 K6	K20R 56 K6	0.09	895		50.5	45.3	0.56	0.46	2.5	2.0	2.0	2.4	0.00024	4.9
K21R 63 G6	K20R 56 G6	0.12	880		52.0	48	0.56	0.59	2.5	2.0	2.0	2.3	0.00027	5.7
K21R 71 K6	K20R 63 K6	0.18	925		58.0	54.5	0.51	0.88	2.8	1.6	1.6	2.1	0.00045	7.4
K21R 71 G6	K20R 63 G6	0.25	915		60.0	56.5	0.55	1.10	2.9	2.0	2.0	2.2	0.00060	8.3
K21R 80 K6	K20R 71 K6	0.37	915		66.0	62.5	0.66	1.22	3.4	2.0	2.0	2.0	0.00130	11.0
K21R 80 G6	K20R 71 G6	0.55	915		68.0	65.5	0.67	1.73	3.7	2.2	2.2	2.4	0.00175	12.5
K21R 90 S6	K20R 80 K6	0.75	935		70.0	67.5	0.64	2.43	4.5	2.4	2.4	2.4	0.00325	16.0
K21R 90 L6	K20R 80 G6	1.1	935		73.0	70	0.69	3.15	4.6	2.2	2.2	2.4	0.00425	19.0
K21R 100 L6	K20R 90 L6	1.5	945		76.4	76.2	0.73	3.90	4.6	2.1	2.0	2.4	0.00625	24.0
K21R 112 M6	K20R 100 L6	2.2	950		79.8	78.9	0.74	5.35	5.3	2.2	2.1	2.7	0.01225	33.5
K21R 132 S6	K20R 112 M6	3.0	955		78.5	78.5	0.82	6.7	5.7	1.8	1.6	2.7	0.0180	46
K21R 132 M6	K20R 112 MX6	4.0	955		80.0	79	0.80	9	6.0	2.2	2.0	3.1	0.0230	53
K21R 132 MX6	K20R 132 S6	5.5	955		83.0	83	0.83	11.5	5.0	1.8	1.5	2.3	0.0430	70
K21R 160 M6	K20R 132 M6	7.5	960		85.0	84	0.82	15.5	5.5	2.0	1.6	2.5	0.0530	86
K21R 160 L6	K20R 160 S6	11.0	965		85.2	85	0.86	21.5	5.0	2.0	1.7	2.3	0.1130	114
K21R 180 L6	K20R 160 M6	15.0	965		86.0	85	0.83	30.5	6.0	2.4	2.1	2.7	0.1450	136
K21R 200 L6	K20R 180 S6	18.5	970		88.1	88	0.87	35	5.5	2.0	1.7	2.4	0.2280	175
K21R 200 LX6	K20R 180 M6	22	970		88.8	88.5	0.87	41	6.2	2.2	1.8	2.6	0.2680	200
K21R 225 M6	K20R 200 M6	30	973		90.4	90	0.89	54	6.5	2.2	1.7	2.5	0.4430	265
K21R 250 M6	K20R 225 M6	37	975		91.0	90.8	0.89	66	6.5	2.2	1.7	2.3	0.8250	360
K21R 280 S6	K20R 250 S6	45	980		92.0	92	0.87	81	6.0	2.0	1.5	2.0	1.28	465
K21R 280 M6	K20R 250 M6	55	980		92.5	92	0.88	97.5	6.5	2.3	1.7	2.4	1.48	520
K21R 315 S6	K20R 280 S6	75	985		93.7	93	0.87	133	7.0	2.0	1.6	2.4	2.63	690
K21R 315 M6	K20R 280 M6	90	990		94.4	93.5	0.88	156	7.0	2.0	1.7	2.4	3.33	800
K21R 315 MX6	K20R 315 S6	110	990		94.0	93.8	0.88	192	7.5	2.2	1.7	2.6	3.60	880
K21R 315 MY6	K20R 315 M6	132	990		95.0	94.7	0.88	228	7.5	2.0	1.7	2.4	6.00	1050
K21R 315 L6	K20R 315 L6	160	985		95.3	95	0.89	272	7.5	2.3	1.9	2.4	6.67	1250
K21R 315 LX6	K20R 315 LX6	200	990		95.0	94.7	0.87	349	8.3	2.2	2.0	2.7	8.6	1460
K22R 355 MY6		200	995		96.1	96	0.83	362	7.0	1.5	1.3	2.4	8.1	1550
K22R 355 M6		250	994		96.0	95.7	0.81	464	7.0	1.8	1.3	2.3	8.2	1650
K22R 355 MX6		315	995		96.5	96.5	0.83	568	6.8	1.6	1.3	2.5	12.1	2200
K22R 355 LY6		355	995		96.0	95.8	0.78	684	7.4	1.9	1.4	2.6	14.0	2400

Three-phase motors with squirrel-cage rotor

with surface ventilation, mode of operation S1, continuous duty
insulation class F, degree of protection IP 55

Motor selection data

Design point 400 V, 50 Hz

Type		P_B	n_B	EFF-	$\eta_{4/4B}$	$\eta_{3/4B}$	cos φ_B	I_B 400 V	I_A/I_B	M_A/M_B	M_S/M_B	M_K/M_B	J	m
		kW	rpm	-	%	%	-	A	-	-	-	-	kgm^2	kg
Synchronous speed 750 rpm – 8-pole version														
K21R 71 K8	K20R 63 K8	0.09	675		45.5	40.3	0.51	0.56	2.1	1.9	1.9	2.1	0.00050	6.6
K21R 71 G8	K20R 63 G8	0.12	670		46.5	41.3	0.51	0.73	2.3	1.8	1.8	2.1	0.00060	8.1
K21R 80 K8	K20R 71 K8	0.18	690		56.5	53.8	0.59	0.78	2.8	2.0	2.0	2.2	0.00130	10.5
K21R 80 G8	K20R 71 G8	0.25	695		58.0	54	0.56	1.12	3.0	2.3	2.3	2.5	0.00175	12.0
K21R 90 S8	K20R 80 K8	0.37	700		61.5	56.3	0.54	1.6	3.0	1.9	1.9	2.1	0.00300	15.0
K21R 90 L8	K20R 80 G8	0.55	695		64.9	61.8	0.60	2.04	3.2	1.9	1.9	2.2	0.00375	18.0
K21R 100 L8	K20R 90 L8	0.75	705		67.0	64	0.60	2.7	3.3	2.0	2.0	2.3	0.00625	23.0
K21R 100 LX8	K20R 100 S8	1.1	705		73.0	72.5	0.67	3.25	4.0	2.0	2.0	2.4	0.00900	28.0
K21R 112 M8	K20R 100 L8	1.5	705		75.5	75.3	0.70	4.1	4.4	2.2	2.1	2.5	0.01225	33.5
K21R 132 S8	K20R 112 M8	2.2	705		75.5	75	0.76	5.5	4.5	1.7	1.6	2.3	0.01800	46
K21R 132 M8	K20R 112 MX8	3.0	705		78.0	78	0.75	7.4	4.5	1.7	1.6	2.3	0.0230	53
K21R 160 M8	K20R 132 S8	4.0	710		79.3	79	0.78	9.3	4.0	1.6	1.3	1.9	0.0430	70
K21R 160 MX8	K20R 132 M8	5.5	710		81.4	81	0.78	12.5	4.5	1.7	1.6	2.1	0.0530	86
K21R 160 L8	K20R 160 S8	7.5	725		83.0	83	0.78	16.5	4.5	1.8	1.6	2.1	0.1130	114
K21R 180 L8	K20R 160 M8	11.0	720		85.0	84	0.78	24	4.5	2.0	1.7	2.1	0.1450	136
K21R 200 L8	K20R 180 S8	15.0	725		86.5	86	0.79	31.5	5.0	2.0	1.7	2.3	0.228	175
	K20R 180 M8	18.5	725		87.5	86.5	0.80	38	5.0	1.9	1.7	2.2	0.268	200
K21R 225 S8		18.5	725		89.2	88	0.83	36	5.5	2.0	1.6	2.2	0.440	265
K21R 225 M8	K20R 200 M8	22	725		89.2	89	0.84	42.5	5.0	1.8	1.5	2.2	0.440	265
K21R 250 M8	K20R 225 M8	30	730		90.2	90	0.79	61	5.5	2.2	1.8	2.2	0.825	360
K21R 280 S8	K20R 250 S8	37	735		91.0	90.5	0.80	73.5	5.5	2.0	1.5	2.0	1.35	465
K21R 280 M8	K20R 250 M8	45	735		91.5	91	0.77	92	6.0	2.3	1.8	2.4	1.55	520
K21R 315 S8	K20R 280 S8	55	740		93.1	92	0.80	107	6.5	1.8	1.6	2.3	2.63	690
K21R 315 M8	K20R 280 M8	75	740		93.3	93	0.81	143	6.0	2.0	1.6	2.3	3.33	800
K21R 315 MX8	K20R 315 S8	90	740		93.5	93	0.81	172	6.0	1.9	1.6	2.2	3.60	880
K21R 315 MY8	K20R 315 M8	110	740		94.6	94	0.81	207	6.5	2.1	1.8	2.4	6.00	1100
K21R 315 L8	K20R 315 L8	132	740		95.0	94.3	0.83	242	6.3	2.0	1.7	2.1	6.76	1250
K21R 315 LX8	K20R 315 LX8	160	740		95.2	94.5	0.79	307	7.2	2.2	1.9	2.5	8.71	1430
K22R 355 MY8		160	744		95.2	95	0.80	303	6.8	1.3	1.0	2.5	9.3	1500
K22R 355 M8		200	743		95.6	95.3	0.77	392	6.5	1.6	1.0	2.7	9.5	1600
K22R 355 MX8		250	744		95.8	95.6	0.78	483	6.6	1.3	1.0	2.8	13.4	2200
K22R 355 LY8		280	744		95.3	95.1	0.78	544	8.2	1.2	1.0	2.8	15.8	2400

Noise data

Measurement area related sound pressure level L_{pA} for motors K21R, K22R in standard version

Design voltage and design output, 50 Hz

	L_{pA} dB	L_{pA} dB	L_{pA} dB	L_{pA} dB
	2pole	4pole	6pole	8pole
63 K	46	41	40	-
63 G	46	41	40	-
71 K	48	42	41	37
71 G	48	42	41	37
80 K	52	44	41	40
80 G	52	44	41	40
90 S	56	49	43	42
90 L	56	49	43	42
100 L	59	50	49	47
100 LX	-	50	-	47
112 M	61	53	51	50
112 MX	61	-	-	-
132 S	65	58	54	52
132 SX	65	-	-	-
132 M	-	60	54	52
132 MX	-	-	56	-
160 M	66	60	56	57
160 MX	67	-	-	57
160 L	67	62	61	57
180 M	-	62	-	-
180 L	-	-	61	58
180 M	70	-	-	-
180 L	-	64	-	-
200 L	73	64	62	61
200 LX	73	-	62	-
225 S	-	66	-	59
225 M	74	66	63	59
250 M	74	68	63	63
280 S	75	69	65	61
280 M	75	69	65	61
315 S	78	72	68	65
315 M	78	72	68	65
315 MX	79	76	70	65
315 MY	79	76	68	66
315 L	79	76	68	66
315 LX	79	76	68	66
355 MY. M. MX[1]	77[2]	77	70	68
355 LY. L[1]	77[2]	77	70	68

Measurement area related sound pressure level L_{pA} for motors K20R in standard version

	L_{pA} dB	L_{pA} dB	L_{pA} dB	L_{pA} dB
	2pole	4pole	6pole	8pole
56 K	46	41	40	-
56 G	46	41	40	-
63 K	48	42	41	37
63G	48	42	41	37
71 K	52	44	41	40
71 G	52	44	41	40
80 K	56	49	43	42
80 G	56	49	43	42
90 L	59	50	49	47
100 S	61	50	-	47
100 L	61	53	51	50
100 LX	-	-	-	-
112 M	65	58	54	52
112 MX	-	-	54	52
132 S	66	60	56	57
132 M	66	60	56	57
160 S	67	62	61	57
160 M	67	62	61	58
180 S	70	64	62	61
180 M	73	64	62	61
200 M	73	66	63	59
200 L	74	66	-	-
225 M	74	68	63	63
250 S	75	69	65	61
250 M	75	69	65	61
280 S	78	72	68	65
280 M	78	72	68	65
315 S	79	76	70	65
315 M	79	76	68	66
315 L	79	76	68	66
315 LX	79	76	68	66

[1] series K22R

[2] with axial fan, rotation-sense dependable fan

The data given in the table are valid for nominal output, nominal voltage, and 50 Hz with tolerances of +3 dB. Noise measurement according to DIN EN 21 680 p. 1

Bearing arrangement

Basic version

Design selection data

Type			D-end					N-end				Figure		Fixed bearing
		Antifriction bearing	V-ring	γ-ring	Felt ring	Wave washer	Disc spring	Antifriction bearing	V-ring	Wave washer	Felt ring	DS	NS	
K21R	63	6201 2Z C3	-	-	11.5x19	-	-	6201 2Z C3	-	32	12x22	1	2	without
K21R	71	6202 2Z C3	-	-	14.5x21	-	-	6202 2Z C3	-	35	15x24	1	2	without
K21R	80	6204 2Z C3	-	-	19.5x26	-	-	6204 2Z C3	-	47	20x32	1	2	without
K21R	90	6205 2Z C3	-	-	24.5x35	-	-	6205 2Z C3	-	52	25x40	1	2	without
K21R	100	6206 2Z C3	-	-	29.2x40	-	-	6205 2Z C3	-	52	25x40	1	2	without
K21R	100 LX	6206 2Z C3	-	-	29.2x40	-	-	6206 2Z C3	-	62	30x50	1	2	without
K21R	112 M	6206 2Z C3	-	-	29.2x40	-	-	6206 2Z C3	-	62	30x50	1	2	without
K21R	132 S2,4 T	6208 2RS C3	-	-	39x60	-	-	6206 2Z C3	-	62	30x50	1	2	without
K21R	132 S, SX2,M6,8	6208 2RS C3	-	-	-	80		6207 2RS C3	-	-	-	3	5	without
K21R	132 M4,MX6	6308 2RS C3	-	-	-	90	-	6308 2RS C3	-	-	-	3	5	without
K21R	160 M,MX8	6309 2RS C3	-	-	-	100	-	6308 2RS C3	-	-	-	3	5	without
K21R	160 MX2, L	6310 2RS C3	-	-	-	110	-	6309 2Rs C3	-	-	-	3	5	without
K21R	180 M4, L6, 8	6310 2RS C3	-	-	-	110	-	6309 2RS C3	-	-	-	3	5	without
K21R	180 M2, L4	6310 C3	50A	-	-	110	-	6310 C3	50A	-	-	6	8	N-end
K21R	200 L, LX6	6312 C3	60A	-	-	-	130	6310 C3	50A	-	-	6	8	N-end
K21R	200 LX2	6312 C3	60A	-	-	-	130	6312 C3	60A	-	-	6	8	N-end
K21R	225 M2	6312 C3	60A	-	-	-	130	6312 C3	60A	-	-	6	8	N-end
K21R	225 S4, 8, M4,6,8,	6313 C3	65A	-	-	-	140	6312 C3	60A	-	-	6	8	N-end
K21R	250 M2	6313 C3	65A	-	-	-	140	6313 C3	65A	-	-	6	8	N-end
K21R	250 M4,6,8	6314 C3	70A	-	-	-	150	6313 C3	65A	-	-	6	8	N-end
K21R	280 S2,M2	6314 C3	70A	-	-	-	150	6314 C3	70A	-	-	6	8	N-end
K21R	280 S4,6,8,M4,6,8	6316 C3	80A	-	-	-	170	6314 C3	70A	-	-	6	8	N-end
K21R	315 S2,M2	6316 C3	80A	-	-	-	170	6316 C3	80A	-	-	6	8	N-end
K21R	315 S4,6,8,M4,6,8	6317 C3	80A	-	-	-	180	6316 C3	80A	-	-	6	8	N-end
K21R	315 MX2	6317 C3	-	RB85	-	-	180	6316 C3	80A	-	-	13	16	N-end
K21R	315 MX4,6,8	6220 C3	-	RB100	-	-	180	6316 C3	80A	-	-	13	16	N-end
K21R	315 MY2	6317 C3	-	RB85	-	-	180	6317 C3[1)]	85A	-	-	18	19	N-end
K21R	315 MY4,6,8	6320 C3	-	RB100	-	-	215	6317 C3[1)]	85A	-	-	18	19	N-end
K21R	315 L2, LX2	6317 C3	-	RB85	-	-	180	6317 C3[1)]	85A	-	-	18	19	N-end
K21R	315 L4,6,8, LX4,6,8	6320 C3	-	RB100	-	-	215	6317 C3[1)]	85A	-	-	18	19	N-end
K22R	355 MY/M/MX/LY/L 2pole	6317 C3	-	RB85	-	-	180	6317 C3[1)]	85A	-	-	18	19	N-end
K22R	355 MY/M/MX/LY/L 4,6,8pole	6324 C3	120S	-	-	-	260	6317 C3[1)]	85A	-	-	18	19	N-end

1) for vertical types of mounting Q317 C3
From size K21R 315 MX standard version with relubrication device

Type			D-end					N-end				Figure		Fixed bearing
		Antifriction bearing	V-ring	γ-ring	Felt ring	Wave washer	Disc spring	Antifriction bearing	V-ring	Wave washer	Felt ring	DS	NS	
K20R	56	6201 2Z C3	-	-	11.5x19	-	-	6201 2Z C3	-	32	12x22	1	2	without
K20R	63	6202 2Z C3	-	-	14.5x21	-	-	6202 2Z C3	-	35	15x24	1	2	without
K20R	71	6204 2Z C3	-	-	19.5x26	-	-	6204 2Z C3	-	47	20x32	1	2	without
K20R	80	6205 2Z C3	-	-	24.2x35	-	-	6205 2Z C3	-	52	25x40	1	2	without
K20R	90	6205 2Z C3	-	-	24.5x35	-	-	6205 2Z C3	-	52	25x40	1	2	without
K20R	100	6206 2Z C3	-	-	29.2x40	-	-	6206 2Z C3	-	62	30x50	1	2	without
K20R	112 M2,4,6,8	6207 2RS C3	-	-	-	72		6207 2RS C3	-	-	-	3	5	without
K20R	112 MX6,8	6207 2RS C3	-	-	-	72		6207 2RS C3	-	-	-	3	5	without
K20R	132 S,M	6308 2RS C3	-	-	-	90	-	6308 2RS C3	-	-	-	3	5	without
K20R	160 S,M	6310 2RS C3	-	-	-	110	-	6309 2RS C3	-	-	-	3	5	without
K20R	180 S2,M2	6310 C3	50A	-	-	110	-	6310 C3	50A	-	-	6	8	N-end
K20R	180 S4,6,8 ; M4,6,8	6312 C3	60A	-	-	-	130	6310 C3	50A	-	-	6	8	N-end
K20R	200 M2,L2	6312 C3	60A	-	-	-	130	6312 C3	60A	-	-	6	8	N-end
K20R	200 M4,6,8 ; L4,6,8	6313 C3	65A	-	-	-	140	6312 C3	60A	-	-	6	8	N-end
K20R	225 M2	6313 C3	65A	-	-	-	140	6313 C3	65A	-	-	6	8	N-end
K20R	225 M4,6,8	6314 C3	70A	-	-	-	150	6313 C3	65A	-	-	6	8	N-end
K20R	250 S2,M2	6314 C3	70A	-	-	-	150	6314 C3	70A	-	-	6	8	N-end
K20R	250 S4,6,8 ; M4,6,8	6316 C3	80A	-	-	-	170	6314 C3	70A	-	-	6	8	N-end
K20R	280 S2,M2	6316 C3	80A	-	-	-	170	6316 C3	80A	-	-	6	8	N-end
K20R	280 S4,6,8 ; M4,6,8	6317 C3	80A	-	-	-	180	6316 C3	80A	-	-	6	8	N-end
K20R	315 S2	6317 C3	-	RB85	-	-	180	6316 C3	80A	-	-	13	16	N-end
K20R	315 S4,6,8	6220 C3	-	RB100	-	-	180	6316 C3	80A	-	-	13	16	N-end
K20R	315 M2; L2	6317 C3	-	RB85	-	-	180	6317 C3[1)]	85A	-	-	18	19	N-end
K20R	315 M4,6,8 ; L4,6,8	6320 C3	-	RB100	-	-	215	6317 C3[1)]	85A	-	-	18	19	N-end

1) for vertical types of mounting Q317 C3
From size K20R 315 standard version with relubrication device

Bearing arrangement

Special version "heavy bearing arrangement" VL

Design selection data

Type			D-end			N-end		Figure		Fixed bearing
			Antifriction bearing			Antifriction bearing		DS	NS	
				V-ring	γ-ring		V-ring			
K21R	132	S, SX2,M6,8 VL	NU 208 E	40A	-	6207 RS C3	-	4	10	N-end
K21R	132	M4,MX6 VL	NU 308 E	40A	-	6308 RS C3	-	4	10	N-end
K21R	160	M, MX8 VL	NU 309 E	45A	-	6308 RS C3	-	4	10	N-end
K21R	160	MX2, L VL	NU 310 E	50A	-	6309 RS C3	-	7	10	N-end
K21R	180	M4, L6, 8 VL	NU 310 E	50A	-	6309 RS C3	-	7	10	N-end
K21R	180	M2, L4 VL	NU 310 E	50A	-	6310 C3	50A	7	9	N-end
K21R	200	L, LX6 VL	NU 312 E	60A	-	6310 C3	50A	7	9	N-end
K21R	200	LX2 VL	NU 312 E	60A	-	6312 C3	60A	7	9	N-end
K21R	225	M2 VL	NU 312 E	-	RB60	6312 C3	60A	7	9	N-end
K21R	225	S4, 8, M4,6,8 VL	NU 313 E	-	RB65	6312 C3	60A	7	9	N-end
K21R	250	M2 VL	NU 313 E	-	RB65	6313 C3	65A	7	9	N-end
K21R	250	M4,6,8 VL	NU 314 E	-	RB70	6313 C3	65A	7	9	N-end
K21R	280	S2,M2 VL	NU 314 E	-	RB70	6314 C3	70A	7	9	N-end
K21R	280	S4,6,8,M4,6,8 VL	NU 316 E	-	RB80	6314 C3	70A	7	9	N-end
K21R	315	S2,M2 VL	NU 316 E	-	RB80	6316 C3	80A	7	9	N-end
K21R	315	S4,6,8,M4,6,8 VL	NU 317 E	-	RB85	6316 C3	80A	7	9	N-end
K21R	315	MX2 VL	NU 317 E	-	RB85	6316 C3	80A	15	16	N-end
K21R	315	MX4,6,8 VL	NU 2220 E	-	RB100	6316 C3	80A	15	16	N-end
K21R	315	MY2 VL	NU 317 E	-	RB85	6317 C3[1)]	85A	20	19	N-end
K21R	315	MY4,6,8 VL	NU 320 E	-	RB100	6317 C3[1)]	85A	20	19	N-end
K21R	315	L2, LX2 VL	NU 317 E	-	RB85	6317 C3[1)]	85A	20	19	N-end
K21R	315	L4,6,8, LX4,6,8 VL	NU 320 E	-	RB100	6317 C3[1)]	85A	20	19	N-end
K22R	355	M/MX/L 2pole VL	NU 317 E	-	RB85	6317 C3[1)]	85A	20	19	N-end
K22R	355	M/MX/L 4,6,8pole VL	NU 324 E	120S	-	6317 C3[1)]	85A	20	19	N-end

1) for vertical types of mounting Q317 C3
From size K21R 315 MX standard version with relubrication device

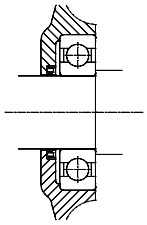
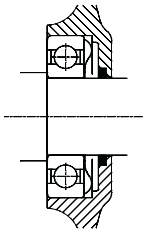
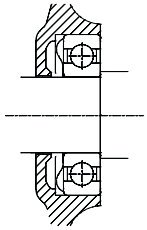
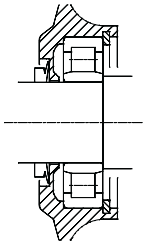
Type			D-end			N-end		Figure		Fixed bearing
			Antifriction bearing			Antifriction bearing		DS	NS	
				V-ring	γ-ring		V-ring			
K20R	112	M2.4.6.8 VL	NU 207 E	40A	-	6207 RS C3	-	4	10	N-end
K20R	112	MX6.8 VL	NU 207 E	40A	-	6207 RS C3	-	4	10	N-end
K20R	132	S.M VL	NU 308 E	40A	-	6308 RS C3	-	4	10	N-end
K20R	160	S.M VL	NU 310 E	50A	-	6309 RS C3	-	7	10	N-end
K20R	180	S2.M2 VL	NU 310 E	50A	-	6310 C3	50A	7	9	N-end
K20R	180	S4.6.8; M4.6.8 VL	NU 312 E	60A	-	6310 C3	50A	7	9	N-end
K20R	200	M2.L2 VL	NU 312 E	-	RB60	6312 C3	60A	7	9	N-end
K20R	200	M4.6.8; L4.6.8 VL	NU 313 E	-	RB65	6312 C3	60A	7	9	N-end
K20R	225	M2 VL	NU 313 E	-	RB65	6313 C3	65A	7	9	N-end
K20R	225	M4.6.8 VL	NU 314 E	-	RB70	6313 C3	65A	7	9	N-end
K20R	250	S2.M2 VL	NU 314 E	-	RB70	6314 C3	70A	7	9	N-end
K20R	250	S4.6.8; M4.6.8 VL	NU 316 E	-	RB80	6314 C3	70A	7	9	N-end
K20R	280	S2.M2 VL	NU 316 E	-	RB80	6316 C3	80A	7	9	N-end
K20R	280	S4.6.8; M4.6.8 VL	NU 317 E	-	RB85	6316 C3	80A	7	9	N-end
K20R	315	S2 VL	NU 317 E	-	RB85	6316 C3	80A	15	16	N-end
K20R	315	S4.6.8 VL	NU 2220 E	-	RB100	6316 C3	80A	15	16	N-end
K20R	315	M2; L2 VL	NU 317 E	-	RB85	6317 C3[1)]	85A	20	19	N-end
K20R	315	M4.6.8; L4.6.8 VL	NU 320 E	-	RB100	6317 C3[1)]	85A	20	19	N-end

1) for vertical types of mounting Q317 C3
From size K20R 315 standard version with relubrication device

Bearing arrangement

Figures

Design selection data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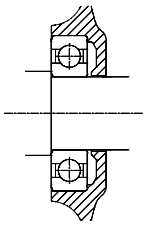	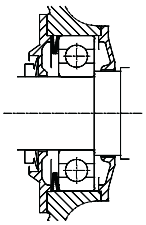	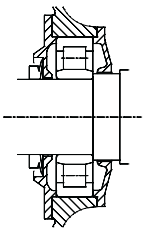	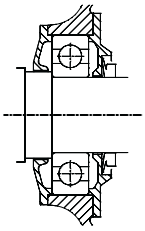
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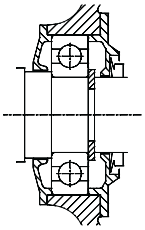	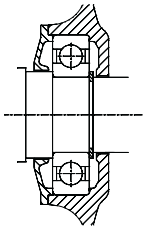	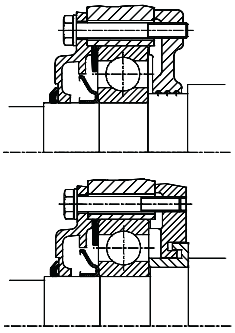	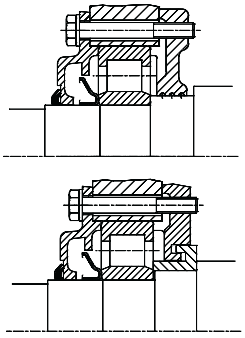
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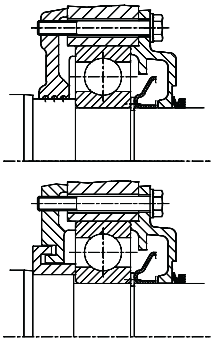
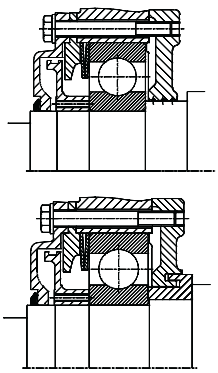
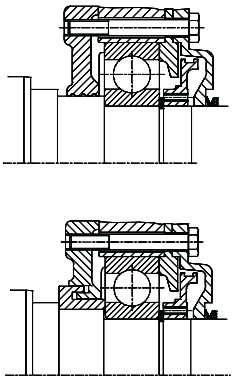
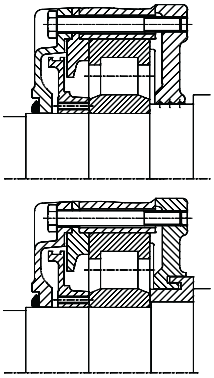
			

Fig.16	Fig. 18	Fig. 19	Fig. 20

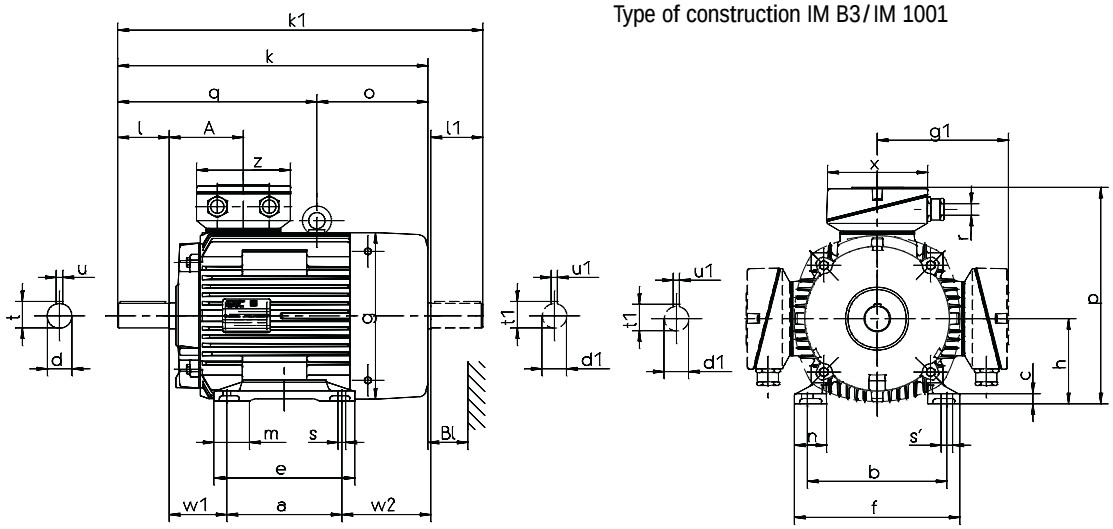
Three-phase motors with squirrel-cage rotor, basic version

with surface ventilation, cooling method IC 411, degree of protection IP 55

Design selection data

Dimensions

Type of construction IM B3 / IM 1001



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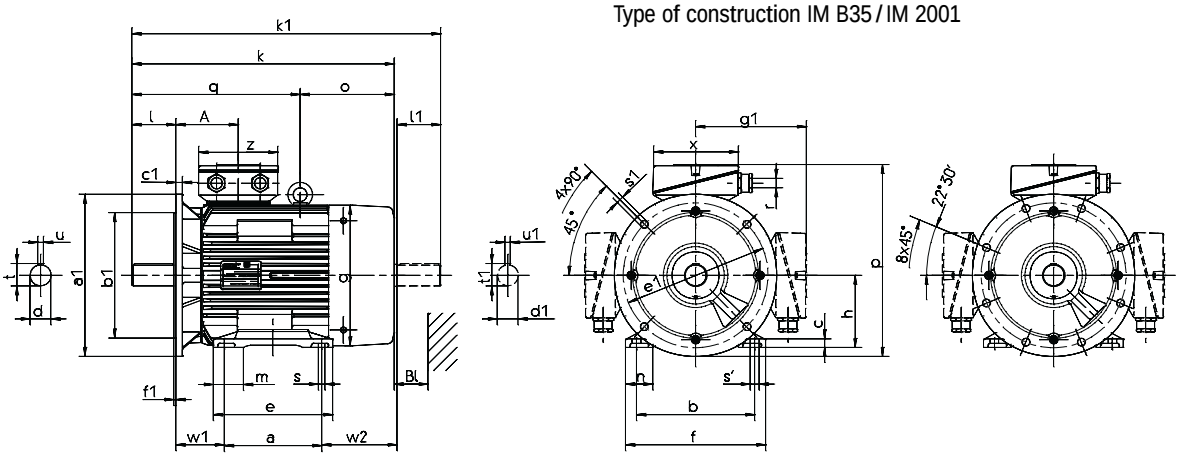
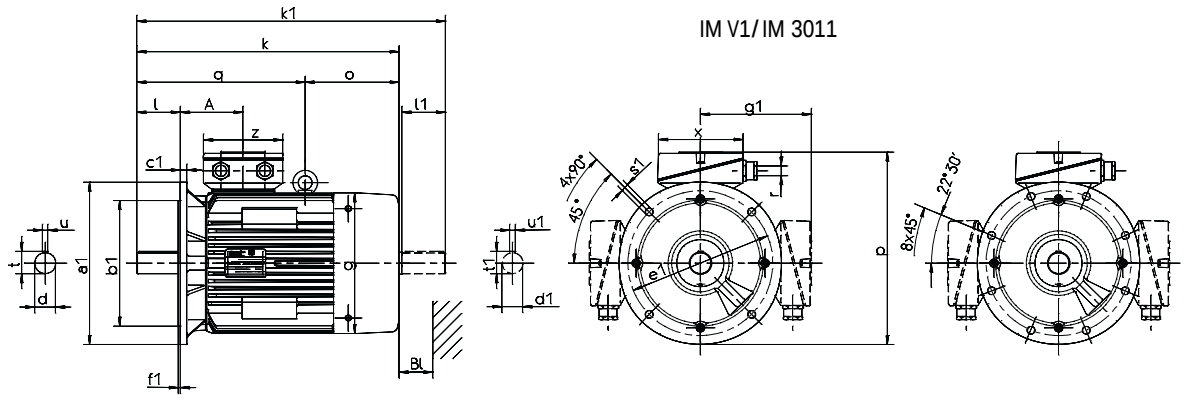


Type of construction IM B5 / IM 3001

IM V1 / IM 3011



Three-phase motors with squirrel-cage rotor, basic version

with surface ventilation, cooling method IC 411, degree of protection IP 55

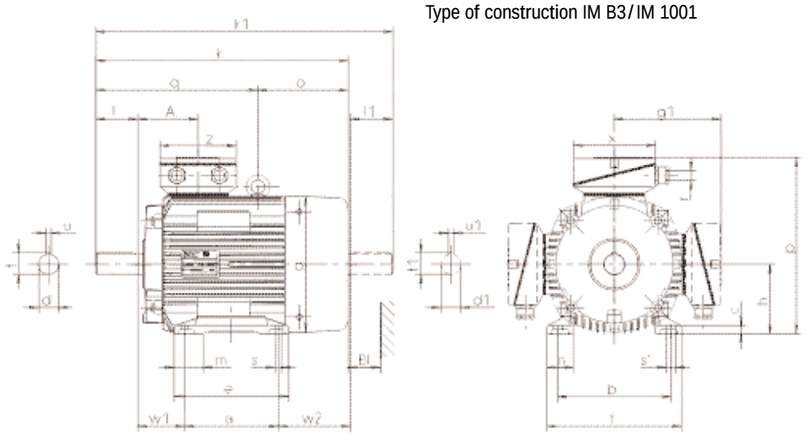
Three-phase motors with squirrel-cage rotor, Transnorm version

with surface ventilation. cooling method IC 411, degree of protection IP 55

Design selection data

Dimensions

Type of construction IM B3 / IM 1001



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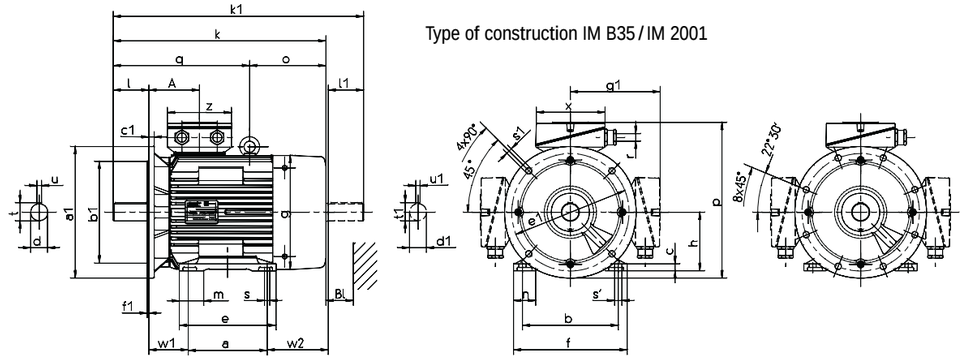
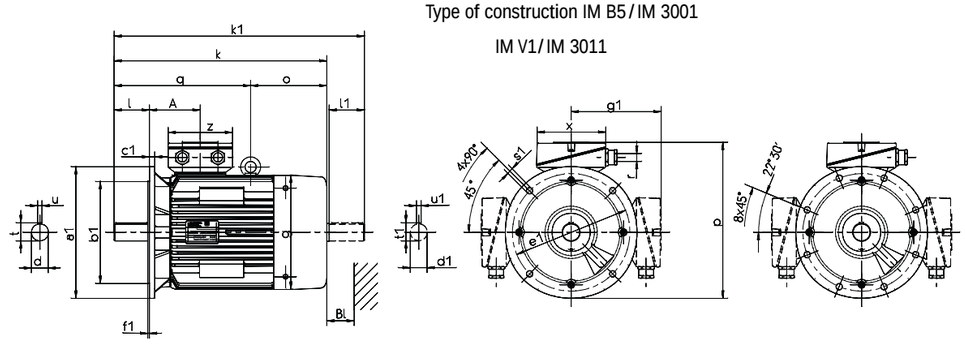


Type of construction IM B5 / IM 3001

IM V1 / IM 3011



Three-phase motors with squirrel-cage rotor, basic version

with surface ventilation, cooling method IC 411, degree of protection IP 55

Design selection data

Dimensions

Standard version, version for inverter feeding U up to 420 V	IM B5, IM B35	IM B14 K, IM B34 K	IM B14 G, IM B34 G	a	b	c	d	d_1	Centre holes acc. to DIN 332-DS	e	f	g	g_1	h	k	k_1	l	l_1	m	m_1	n	o	p (IM B3)	p (IM B35, IM B5)	q	s	s'	t	t_1	u	u_1	w_1	w_2	A	Bl	Term. box Standard	Hole pattern	Relubrication possible	Tolerance h	Tolerance b_1	Tolerance d	Tolerance d_1	Counterparts	Terminal box right / left: p (IM B3 KL/KR)	p (IM B35 KL/KR)	p (IM B5 KL/KR)	Type of terminal box
Type	Flange sizes			B	A	HA	D	DA	-	BB	AB	AC	-	H	L	LC	E	EA	BA		AA	-	HD	HD	-	K	K'	GA	GC	F	FA	C	CA	-	-	-	-	-	-	-	-	HD	HD	HD	-
K21O 56 K2,4	A120	C80	C105	71	90	7	9	-	M3	86	110	-	-	56	152	-	20	-	-	-	18	-	154	154	-	6	6	10.2	10.2	3	-	36	-	58	14	KK16_M20	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M20
K21R 56 G2,4	A120	C80	C105	71	90	7	9	-	M3	86	110	109	-	56	176	-	20	-	-	-	18	-	154	154	-	6	6	10.2	10.2	3	-	36	-	58	14	KK16_M20	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M20
K21R 63 K2,4,6	A140	C90	C120	80	100	10	11	11	M4	100	128	109	-	63	179	205	23	23	-	-	28	-	161	168	-	8	8	12.5	12.5	4	4	40	39	58	14	KK16_M20	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M20
K21R 63 G2,4,6	A140	C90	C120	80	100	10	11	11	M4	100	128	109	-	63	179	205	23	23	-	-	28	-	161	168	-	8	8	12.5	12.5	4	4	40	39	58	14	KK16_M20	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M20
K21R 71 K2,4,6,8	A160	C105	C140	90	112	11	14	14	M5	116	138	124	-	71	206	239	30	30	-	-	32	-	175	184	-	8	8	16	16	5	5	45	43.5	61	14	KK16_M20	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M20
K21R 71 G2,4,6,8	A160	C105	C140	90	112	11	14	14	M5	116	138	124	-	71	206	239	30	30	-	-	32	-	175	184	-	8	8	16	16	5	5	45	43.5	61	14	KK16_M20	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M20
K21R 80 K2,4,6,8	A200	C120	C160	100	125	12	19	19	M6	125	168	139	-	80	249	293	40	40	-	-	38	-	191	211	-	10	10	21.5	21.5	6	6	50	63	67	16	KK16_M20	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M20
K21R 80 G2,4,6,8	A200	C120	C160	100	125	12	19	19	M6	125	168	139	-	80	249	293	40	40	-	-	38	-	191	211	-	10	10	21.5	21.5	6	6	50	63	67	16	KK16_M20	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M20
K21R 90 S2,4,6,8	A200	C140	C160	100	140	14	24	22	M8	130	178	157	-	90	275	330	50	50	-	-	40	-	210	220	-	10	10	27	24.5	8	6	56	74	70	16	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 90 L2,4,6,8	A200	C140	C160	125	140	14	24	22	M8	155	178	157	-	90	297	352	50	50	-	-	40	-	210	220	-	10	10	27	24.5	8	6	56	71	70	16	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 100 L2,4,6,8	A250	C160	C200	140	160	15	28	24	M10	175	192	177	-	100	331	386	60	50	-	-	45	-	227	252	-	12	12	31	27	8	8	63	73	75	18	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 100 LX4,8	A250	C160	C200	140	160	11	28	28	M10	171	188	196	-	100	357	425	60	60	-	-	32	-	237	262	236	12	12	31	31	8	8	63	102	77	20	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 112 M2	A250	C160	C200	140	190	18	28	28	M10	180	224	196	-	112	357	425	60	60	-	-	50	-	249	262	236	12	12	31	31	8	8	70	95	77	20	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 112 M6,8	A250	C160	C200	140	190	18	28	28	M10	180	224	196	-	112	391	459	60	60	-	-	50	-	249	262	236	12	12	31	31	8	8	70	95	77	20	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 112 MX2	A250	C160	C200	140	190	18	28	28	M10	180	224	196	-	112	391	459	60	60	-	-	50	-	249	262	236	12	12	31	31	8	8	70	129	77	20	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 112 M4	A250	C160	C200	140	190	18	28	28	M10	180	224	196	-	112	391	459	60	60	-	-	50	-	249	262	236	12	12	31	31	8	8	70	129	77	20	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 132 S2T	A300	C160	C200	140	216	18	38	28	M10	180	256	196	-	132	430	498	80	60	-	-	50	-	269	299	275	12	12	41	31	10	8	89	129	96	20	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 132 S4T	A300	C160	C200	140	216	18	38	28	M10	180	256	196	-	132	460	528	80	60	-	-	50	-	269	299	275	12	12	41	31	10	8	89	129	96	20	KK16_M25	4L	no	-0.5	j6	k6	k6	H7	on R.	on R.	on R.	KK16_M25
K21R 132 S2	A300	C160	C200	140	216	16	38	32	M12	180	256	217	178	132	459	542	80	80	55	-	50	168	310	328	291	12	12	41	35	10	10	89	153	108	35	KK25_M32	4L	no	-0.5	j6	k6	k6	H7	257	275	275	KK25_M32
K21R 132 SX2	A300	C160	C200	140	216	16	38	32	M12	180	256	217	178	132	479	562	80	80	55	-	50	188	310	328	291	12	12	41	35	10	10	89	173	108	35	KK25_M32	4L	no	-0.5	j6	k6	k6	H7	257	275	275	KK25_M32
K21R 132 S4,6,8	A300	C160	C200	140	216	16	38	32	M12	180	256	217	178	132	459	542	80	80	55	-	50	168	310	328	291	12	12	41	35	10	10	89	153	108	35	KK25_M32	4L	yes	-0.5	j6	k6	k6	H7	257	275	275	KK25_M32
K21R 132 M4	A300	C200	C250	178	216	16	38	38	M12	218	256	258	199	132	481	565	80	80	55	-	50	173	331	349	308	12	12	41	41	10	10	89	138	114	35	KK25_M32	4L	yes	-0.5	j6	k6	k6	H7	279	297	297	KK25_M32
K21R 132 MX6	A300	C200	C250	178	216	16	38	38	M12	218	256	258	199	132	481	565	80	80	55	-	50	173	331	349	308	12	12	41	41	10	10	89	138	114	35	KK25_M32	4L	yes	-0.5	j6	k6	k6	H7	279	297	297	KK25_M32
K21R 132 M6,8	A300	C160	C200	178	216	16	38	32	M12	218	256	217	178	132	479	562	80	80	55	-	50	188	310	328	291	12	12	41	35	10	10	89	135	108	35	KK25_M32	4L	no	-0.5	j6	k6	k6	H7	257	275	275	KK25_M32
K21R 160 M2,4,6,8	A350	C200	C250	210	254	18	42	38	M16	257	296	258	214	160	559	643	110	80	60	-	55	221	374	389	338	15	15	45	41	12	10	108	135	114	35	KK63_25	4L	no	-0.5	h6	k6	k6	H7	307	322	322	KK63_25
K21R 160 MX8	A350	C200	C250	210	254	18	42	38	M16	257	296	258	199	160	559	643	110	80	60	-	55	221	374	389	338	15	15	45	41	12	10	108	135	114	35	KK63_25	4L	no	-0.5	h6	k6	k6	H7	307	322	322	KK63_25
K21R 160 MX2	A350	C250	C300	210	254	18	42	42	M16	257	296	313	242	160	571	686	110	110	60	-	55	211	402	417	360	15	20	45	45	12	12	108	148	138	35	KK63_M40	4L	yes	-0.5	h6	k6	k6	H7	336	351	351	KK63_M40
K21R 160 L2,4,6,8	A350	C250	C300	254	254	18	42	42	M16	301	296	313	242	160	609	724	110	110	60	-	55	249	402	417	360	15	20	45	45	12	12	108	142	138	35	KK63_M40	4L	yes	-0.5	h6	k6	k6	H7	336	351	351	KK63_M40
K21R 180 M2	A350	-	-	241	279	20	48	48	M16	288	328	351	261	180	635	751	110	110	65	-	62	239	441	436	396	15	20	51.5	51.5	14	14	121	169	147	35	KK63_M40	4L	yes	-0.5	h6	k6	k6	H7	369	364	364	KK63_M40
K21R 180 M4	A350	C300	-	241	279	20	48	42	M16	288	328	313	242	180	609	724	110	110	65	-	62	249	422	417	360	15	20	51.5	45	14	12	121	142	138	35	KK63_M40	4L	yes	-0.5	h6	k6	k6	H7	356	351	351	KK63_M40
K21R 180 L4	A350	-	-	279	279	20	48	48	M16	326	328	351	261	180	680	796	110	110	65	-	62	284	441	436	396	15	20	51.5	51.5	14	14	121	176	147	35	KK63_M40	4L	yes	-0.5	h6	k6	k6	H7	369	364	364	KK63_M40
K21R 180 L6,8	A350	C300	-	279	279	20	48	42	M16	326	328	313	242	180	609	724	110	110	65	-	62	249	422	417	360	15	20	51.5	45	14	12	121	104	138	35	KK63_M40	4L	yes	-0.5	h6	k6	k6	H7	369	364	364	KK63_M40
K21R 200 L2,4,6,8	A400	-	-	305	318	22	55	48	M20	360	372	351	261	200	680	796	110	110	70	-	70	284	461	461	396	19	25	59	51.5	16	14	133	138	147	35	KK63_M50	4L	yes	-0.5	h6	m6	m6	H7	389	389	389	KK63_M50
K21R 200 LX6	A400	-	-	305	318	22	55	48	M20	360	372	351	261	200	680	796	110	110	70	-	70	284	461	461	396	19	25	59	51.5	16	14	133	138	147	35	KK63_M50	4L	yes	-0.5	h6	m6	m6	H7	389	389	389	KK63_M50
K21R 200 LX2	A400	-	-	305	318	22	55	55	M20	360	372	390	300	200	727	851	110	110	70	-	70	292	500	500	435	19	25	59	59	16	16	133	193	168	35	KK100_M50	4L	yes	-0.5	h6	m6	m6	H7	417	417	417	KK100_M50
K21R 225 S4,8	A450	-	-	286	356	25	60	55	M20	343	413	390	300	225	757	881	140	110	75	-	75	292	525	525	465	19	25	64	59	18	16	149	196	168	40	KK100_M50	8L	yes	-0.5	h6	m6	m6	H7	442	442	442	KK100_M50
K21R 225 M2	A450	-	-	311	356	25	55	55	M20	368	413	390	300	225	767	891	110	110	75	-	75	332	525	525	435	19	25	59	59	16	16	149	211	168	40	KK100_M50	8L	yes	-0.5	h6	m6	m6	H7	442	442	442	KK100_M50
K21R 225 M4	A450	-	-	311	356	25	60	55	M20	368	413	390	300	225	797	921	140	110	75	-	75	332	525	525	465	19	25	64	59	18	16	149	211	168	40	KK100_M50	8L	yes	-0.5	h6	m6	m6	H7	442	442	442	KK100_M50
K21R 225 M6,8	A450	-	-	311	356	25	60	55	M20	368	413	390	300	225	757	881	140	110	75	-	75	292	525	525	465	19	25	64	59	18	16	149	171	168	40	KK100_M50	8L	yes	-0.5	h6	m6	m6	H7	442	442	442	KK100_M50
K21R 250 M2	A550	-	-	349	406	28	60	55	M20	412	471	440	358	250	862	977	140	110	84	-	84	382	608	633	480	24	30	64	59	18	16	168	210	177	45	KK200_M63	8L	yes	-0.5	h6	m6	m6	H7	484	509	509	KK200_M63
K21R 250 M4,6,8	A550	-	-	349	406	28	65	55	M20	412	471	440	358	250	862	977	140	110	84	-	84	382	608	633	480	24	30	69	59	18	16	168	210	177	45	KK200_M63	8L	yes	-0.5	h6	m6	m6	H7	484	509	509	KK200_M63
K21R 280 S2	A550	-	-	368	457	32	65	65	M20	431	522	490	386	280	924	1072	140	140	96	-	94	383	666	661	541	24	30	69	69	18	18	190	234	206	50	KK200_M63	8L	yes	-1	h6	m6	m6	H7	546	541	541	KK200_M63
K21R 280 S4,6,8	A550	-	-	368	457	32	75	65	M20	431	522	490	386	280	924	1072	140	140	96	-	94	383	666	661	541	24	30	79.5	69	20	18	190	234	206	50	KK200_M63	8L	yes	-1	h6	m6	m6	H7	546	541	541	KK200_M63
K21R 280 M2	A550	-	-	419	457	32	65	65	M20	482	522	490	386	280	970	1118	140	140	96	-	94	429	666	661	541	24	30	69	69	18	18	190	229	206	50	KK200_M63	8L	yes	-1	h6	m6	m6	H7	546	541	541	KK200_M63
K21R 280 M4,6,8	A550	-	-	419	457	32	75	65	M20	482	522	490	386	280	970	1118	140	140	96	-	94	429	666	661	541	24	30	79.5	69	20	18	190	229	206	50	KK200_M63	8L	yes	-1	h6	m6	m6	H7	546	541	541	KK200_M63
K21R 315 S2	A660	-	-	406	508	44	65	65	M20	503	590	550	416	315	1050	1218	140	140	120	-	126	504	731	746	546	28	35	69	69	18	18	216	316	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	610	KK200_M63
K21R 315 S4,6,8	A660	-	-	406	508	44	80	70	M20	503	590	550	416	315	1080	1248	170	140	120	-	126	504	731	746	576	28	35	85	74.5	22	20	216	316	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	610	KK200_M63
K21R 315 M2	A660	-	-	457	508	44	65	65	M20	554	590	550	416	315	1105	1273	140	140	120	-	126	559	731	746	546	28	35	69	69	18	18	216	320	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	610	KK200_M63
K21R 315 M4,6,8	A660	-	-	457	508	44	80	70	M20	554	590	550	416	315	1135	1303	170	140	120	-	126	559	731	746	576	28	35	85	74.5	22	20	216	320	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	610	KK200_M63
K21R 315 MX2	A660	-	-	457	508	44	65	65	M20	554	590	550	416	315	1185	1353	140	140	120	150	126	639	731	746	546	28	35	69	69	18	18	216	400	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	610	KK200_M63
K21R 315 MX4	A660	-	-	457	508	44	80	70	M20	554	590	550	416	315	1215	1383	170	140	120	150	126	639	731	746	576	28	35	85	74.5	22	20	216	400	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	610	KK200_M63
K21R 315 MX6,8	A660	-	-	457	508	44	80	70	M20	554	590	550	416	315	1135	1303	170	140	120	150	126	559	731	746	576	28	35	85	74.5	22	20	216	320	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	610	KK200_M63
K21R 315 MX10,12	A660	-	-	457	508	44	80	70	M20	554	590	550	416	315	1135	1303	170	140	120	150	126	559	731	746	576	28	35	85	74.5	22	20	216	320	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	610	KK200_M63
K21R 315 MY2	A660	-	-	457	508	44	65	65	M20	573	590	610	498	315	1270	1448	140	140	120	-	110	630	774	789	640	28	35	69	69	18	18	216	495	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	643	KK400_M63
K21R 315 MY4,6,8	A660	-	-	457	508	44	80	70	M20	573	590	610	498	315	1300	1478	170	140	120	-	110	630	774	789	670	28	35	85	74.5	22	20	216	495	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	643	KK400_M63
K21R 315 L2	A660	-	-	508	508	44	65	65	M20	624	590	610	498	315	1390	1543	140	140	120	-	110	645	774	789	745	28	35	69	69	18	18	216	539	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	643	KK400_M63
K21R 315 L4,6,8	A660	-	-	508	508	44	80	70	M20	624	590	610	498	315	1420	1598	170	140	120	-	110	645	774	789	775	28	35	85	74.5	22	20	216	564	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	643	KK400_M63
K21R 315 LX2	A660	-	-	508	508	44	65	65	M20	624	590	610	481	315	1510	1688	140	140	120	-	110	765	796	811	745	28	35	69	69	18	18	216	684	230	55	VIK400T	8L	yes	-1	h6	m6	m6	H7	628	643	643	VIK400T
K21R 315 LX4	A660	-	-	508	508	44	80	70	M20	624	590	610	481	315	1540	1723	170	140	120	-	110	765	796	811	775	28	35	85	74.5	22	20	216	689	230	55	VIK400T	8L	yes	-1	h6	m6	m6	H7	628	643	643	VIK400T
K21R 315 LX6,8	A660	-	-	508	508	44	80	70	M20	624	590	610	498	315	1420	1598	170	140	120	-	110	645	796	811	775	28	35	85	74.5	22	20	216	564	230	55	VIK400T	8L	yes	-1	h6	m6	m6	H7	628	643	643	VIK400T
K22R 355 MY2,M2	A800	-	-	560	610	44	80	80	M20	750	700	715	-	355	1530	1715	170	170	140	200	130	662	1172	1217	868	28	35	85	85	22	22	254	561	250	60	KK630_M63	8L	yes	-1	h6	m6	m6	H7	-	-	-	-
K22R 355 MY4,6,8	A800	-	-	560	610	44	100	80	M24	750	700	715	-	355	1570	1755	210	170	140	200	130	662	1172	1217	908	28	35	106	85	28	22	254	561	250	60	KK630_M63	8L	yes	-1	h6	m6	m6	H7	-	-	-	-
K22R 355 M4	A800	-	-	560	610	44	100	80	M24	750	700	715	-	355	1570	1755	210	170	140	200	130	662	1172	1217	908	28	35	106	85	28	22	254	561	250	60	KK630_M63	8L	yes	-1	h6	m6	m6	H7	-	-	-	-
K22R 355 M6,8	A800	-	-	560	610	44	100	80	M24	750	700	715	-	355	1570	1755	210	170	140	200	130	662	1172	1217	908	28	35	106	85	28	22	254	561	250	60	KK630_M63	8L	yes	-1	h6	m6	m6	H7	-	-	-	-
K22R 355 MX6,8	A800	-	-	560	610	44	100	80	M24	750	700	715	-	355	1690	1875	210	170	140	200	130	782	1172	1217	908	28	35	106	85	28	22	254	681	327	60	KK630_M63	8L	yes	-1	h6	m6	m6	H7	-	-	-	-
K22R 355 MX2	A800	-	-	560	610	44	80	80	M20	750	700	715	-	355	1650	1835	170	170	140	200	130	782	1172	1217	868	28	35	85	85	22	22	254	681	327	60	KK630_M63	8L	yes	-1	h6	m6	m6	H7	-	-	-	-
K22R 355 LY2,L2	A800	-	-	630	610	44	80	80	M20	750	700	715	-	355	1650	1835	170	170	140	200	130	782	1179	1224	868	28	35	85	85	22	22	254	611	327	60	KK1000	8L	yes	-1	h6	m6	m6	H7	-	-	-	-
K22R 355 MX4	A800	-	-	560	610	44	100	80	M24	750	700	715	-	355	1690	1875	210	170	140	200	130	782	1179	1224	908	28	35	106	85	28	22	254	681	327	60	KK1000	8L	yes	-1	h6	m6	m6	H7	-	-	-	-
K22R 355 LY4,6,8,L4	A800	-	-	630	610	44	100	80	M24	750	700	715	-	355	1690	1875	210	170	140	200	130	782	1179	1224	908	28	35	106	85	28	22	254	611	327	60	KK1000	8L	yes	-1	h6	m6	m6	H7	-	-	-	-

Three-phase motors with squirrel-cage rotor, Transnorm version

with surface ventilation, cooling method IC 411, degree of protection IP 55

Design selection data

Dimensions

Standard version, version for inverter feeding U up to 420 V	IM B5, IM B35	IM B14 K, IM B34 K	IM B14 G, IM B34 G	a	b	c	d	d_1	Centre holes acc. to DIN 332-DS	e	f	g	g_1	h	k	k_1	l	l_1	m	n	o	p (IM B3)	p (IM B35, IM B5)	q	s	s'	t	t_1	u	u_1	w_1	w_2	A	BI	Terminal box	Hole pattern	Relubrication possible	Tolerance h	Tolerance b_1	Tolerance d	Tolerance d_1	Counterparts	Terminal box right / left: p (IM B3 KL/KR)	Terminal box right / left: p (IM B35 KL/KR)	Terminal box right / left: Terminal box
Type	Flange sizes			B	A	HA	D	DA	-	BB	AB	AC	-	H	L	LC	E	EA	BA	AA	-	HD	HD	-	K	K'	GA	GC	F	FA	C	CA	-	-	-	-	-	-	-	-	-	HD	HD	-
K20R 56K	A140	C90	C120	71	90	7	11	11	M4	86	110	109	-	56	179	205	23	23	-	18	-	154	168	-	6	6	12.5	12.5	4	4	36	52	58	14	KK16_M20	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M20
K20R 56G	A140	C90	C120	71	90	7	11	11	M4	86	110	109	-	56	179	205	23	23	-	18	-	154	168	-	6	6	12.5	12.5	4	4	36	52	58	14	KK16_M20	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M20
K20R 63K	A160	C105	C140	80	100	7.5	14	14	M5	95	120	124	-	63	206	239	30	30	-	21	-	167	184	-	7	7	16	16	5	5	40	59	61	14	KK16_M20	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M20
K20R 63G	A160	C105	C140	80	100	7.5	14	14	M5	95	120	124	-	63	206	239	30	30	-	21	-	167	184	-	7	7	16	16	5	5	40	59	61	14	KK16_M20	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M20
K20R 71K	A200	C120	C160	90	112	8	19	19	M6	134	135	139	-	71	249	293	40	40	-	23	-	182	211	-	7	7	21.5	21.5	6	6	45	78	67	16	KK16_M20	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M20
K20R 71G	A200	C120	C160	90	112	8	19	19	M6	134	135	139	-	71	249	293	40	40	-	23	-	182	211	-	7	7	21.5	21.5	6	6	45	78	67	16	KK16_M20	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M20
K20R 80K	A200	C140	C160	100	125	9	22	22	M8	124	152	157	-	80	275	330	50	50	-	26	-	200	220	-	10	10	24.5	24.5	6	6	50	80	70	16	KK16_M25	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M25
K20R 80G	A200	C140	C160	100	125	9	22	22	M8	146	152	157	-	80	297	352	50	50	-	26	-	200	220	-	10	10	24.5	24.5	6	6	50	102	70	16	KK16_M25	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M25
K20R 90L	A250	C160	C200	125	140	9.5	24	24	M8	150	167	177	-	90	321	376	50	50	-	25	-	217	252	-	10	10	27	27	8	8	56	95	75	18	KK16_M25	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M25
K20R 100S	A250	C160	C200	112	160	11	28	28	M10	171	188	196	-	100	357	425	60	60	-	32	-	237	262	236	12	12	31	31	8	8	63	130	77	20	KK16_M25	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M25
K20R 100L2,4	A250	C160	C200	140	160	11	28	28	M10	171	188	196	-	100	391	459	60	60	-	32	-	237	262	236	12	12	31	31	8	8	63	102	77	20	KK16_M25	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M25
K20R 100L6,8	A250	C160	C200	140	160	11	28	28	M10	205	188	196	-	100	357	425	60	60	-	32	-	237	262	236	12	12	31	31	8	8	63	136	77	20	KK16_M25	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M25
K20R 100LX4	A250	C160	C200	140	160	11	28	28	M10	171	188	196	-	100	421	489	60	60	-	32	-	237	262	236	12	12	31	31	8	8	63	102	77	20	KK16_M25	4L	-	-0.5	j6	k6	k6	H7	on R.	on R.	KK16_M25
K20R 112M2	A300	C160	C200	140	190	15	32	32	M12	172	226	217	178	112	479	562	80	80	42	45	188	290	328	291	12	12	35	35	10	10	70	192	108	35	KK25_M32	4L	-	-0.5	j6	k6	k6	H7	237	275	KK25_M32
K20R 112M4,6,8	A300	C160	C200	140	190	15	32	32	M12	172	226	217	178	112	459	542	80	80	42	45	168	290	328	291	12	12	35	35	10	10	70	172	108	35	KK25_M32	8L	yes	-0.5	j6	k6	k6	H7	237	275	KK25_M32
K20R 112MX6,8	A300	C160	C200	140	190	15	32	32	M12	172	226	217	178	112	479	562	80	80	42	45	188	290	328	291	12	12	35	35	10	10	70	192	108	35	KK25_M32	4L	-	-0.5	j6	k6	k6	H7	237	275	KK25_M32
K20R 132S	A350	C200	C250	140	216	15	38	38	M12	180	256	258	199	132	481	565	80	80	47	50	173	331	374	308	12	12	41	41	10	10	89	176	114	35	KK25_M32	8L	yes	-0.5	j6	k6	k6	H7	279	322	KK25_M32
K20R 132M	A350	C200	C250	178	216	15	38	38	M12	218	256	258	199	132	529	613	80	80	47	50	221	331	374	308	12	12	41	41	10	10	89	186	114	35	KK25_M32	4L	-	-0.5	j6	k6	k6	H7	279	322	KK25_M32
K20R 160S2	A350	C250	C300	178	254	18	42	42	M16	225	296	313	242	160	571	686	110	110	56	55	211	402	442	360	15	20	45	45	12	12	108	180	138	35	KK63_M40	4L	-	-0.5	j6	k6	k6	H7	336	376	KK63_M40
K20R 160S4,6,8	A350	C250	C300	178	254	18	48	42	M16	225	296	313	242	160	571	686	110	110	56	55	211	402	442	360	15	20	51.5	45	14	12	108	180	138	35	KK63_M40	8L	yes	-0.5	j6	k6	k6	H7	336	376	KK63_M40
K20R 160M2	A350	C250	C300	210	254	18	42	42	M16	257	296	313	242	160	609	724	110	110	56	55	249	402	442	360	15	20	45	45	12	12	108	186	138	35	KK63_M40	4L	-	-0.5	j6	k6	k6	H7	336	376	KK63_M40
K20R 160M4,6,8	A350	C250	C300	210	254	18	48	42	M16	257	296	313	242	160	609	724	110	110	56	55	249	402	442	360	15	20	51.5	45	14	12	108	186	138	35	KK63_M40	8L	yes	-0.5	j6	k6	k6	H7	336	376	KK63_M40
K20R 180S2	A400	-	-	203	279	20	48	48	M16	250	328	351	261	180	635	751	110	110	65	62	239	441	486	396	15	20	51.5	51.5	14	14	121	207	147	35	KK63_M40	4L	yes	-0.5	j6	k6	k6	H7	369	414	KK63_M40
K20R 180S4,6,8	A400	-	-	203	279	20	55	48	M20	250	328	351	261	180	635	751	110	110	65	62	239	441	486	396	15	20	59	51.5	16	14	121	207	147	35	KK63_M40	4L	-	-0.5	j6	k6	k6	H7	369	414	KK63_M40
K20R 180M2	A400	-	-	241	279	20	48	48	M16	288	328	351	261	180	680	796	110	110	65	62	284	441	486	396	15	20	51.5	51.5	14	14	121	214	147	35	KK63_M40	4L	yes	-0.5	j6	k6	k6	H7	369	414	KK63_M40
K20R 180M4,6,8	A400	-	-	241	279	20	55	48	M20	288	328	351	261	180	680	796	110	110	65	62	284	441	486	396	15	20	59	51.5	16	14	121	214	147	35	KK63_M40	4L	yes	-0.5	j6	k6	k6	H7	369	414	KK63_M40
K20R 200M2	A450	-	-	267	318	22	55	55	M20	322	372	390	300	200	727	851	110	110	70	70	292	500	525	435	19	25	59	59	16	16	133	231	168	40	KK100_M50	4L	yes	-0.5	h6	m6	m6	H7	417	442	KK100_M50
K20R 200M4,6,8	A450	-	-	267	318	22	60	55	M20	322	372	390	300	200	757	881	140	110	70	70	292	500	525	465	19	25	64	59	18	16	133	231	168	40	KK100_M50	4L	yes	-0.5	h6	m6	m6	H7	417	442	KK100_M50
K20R 200L2	A450	-	-	305	318	22	55	55	M20	360	372	390	300	200	767	891	110	110	70	70	332	500	525	435	19	25	59	59	16	16	133	233	168	40	KK100_M50	4L	yes	-0.5	h6	m6	m6	H7	417	442	KK100_M50
K20R 200L4,6,8	A450	-	-	305	318	22	60	55	M20	360	372	390	300	200	797	921	140	110	70	70	332	500	525	465	19	25	64	59	18	16	133	233	168	40	KK100_M50	4L	yes	-0.5	h6	m6	m6	H7	417	442	KK100_M50
K20R 225M2	A550	-	-	311	356	25	55	55	M20	368	413	440	324	225	832	947	110	110	75	75	382	549	599	450	19	25	59	59	16	16	149	267	177	45	KK100_M50	4L	yes	-0.5	h6	m6	m6	H7	459	509	KK100_M50
K20R 225M4,6,8	A550	-	-	311	356	25	65	55	M20	368	413	440	324	225	862	977	140	110	75	75	382	549	599	480	19	25	69	59	18	16	149	267	177	45	KK100_M50	8L	yes	-0.5	h6	m6	m6	H7	459	509	KK100_M50
K20R 250S2	A550	-	-	311	406	28	65	65	M20	374	469	490	386	250	924	1072	140	140	84	84	383	636	661	541	24	30	69	69	18	18	168	313	206	50	KK200_M63	8L	yes	-0.5	h6	m6	m6	H7	516	541	KK200_M63
K20R 250S4,6,8	A550	-	-	311	406	28	75	65	M20	374	469	490	386	250	924	1072	140	140	84	84	383	636	661	541	24	30	79.5	69	20	18	168	313	206	50	KK200_M63	8L	yes	-0.5	h6	m6	m6	H7	516	541	KK200_M63
K20R 250M2	A550	-	-	349	406	28	65	65	M20	412	469	490	386	250	924	1072	140	140	84	84	383	636	661	541	24	30	69	69	18	18	168	275	206	50	KK200_M63	8L	yes	-0.5	h6	m6	m6	H7	516	541	KK200_M63
K20R 250M4,6,8	A550	-	-	349	406	28	75	65	M20	412	469	490	386	250	970	1118	140	140	84	84	429	636	661	541	24	30	79.5	69	20	18	168	321	206	50	KK200_M63	8L	yes	-0.5	h6	m6	m6	H7	516	541	KK200_M63
K20R 280S2	A660	-	-	368	457	40	70	70	M20	431	522	550	416	280	1050	1218	140	140	94	88	504	696	746	546	24	30	74.5	74.5	20	20	190	380	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	560	610	KK200_M63
K20R 280S4,6,8	A660	-	-	368	457	40	80	70	M20	431	522	550	416	280	1080	1248	170	140	94	88	504	696	746	576	24	30	85	74.5	22	20	190	380	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	560	610	KK200_M63
K20R 280M2	A660	-	-	419	457	40	70	70	M20	482	522	550	416	280	1105	1273	140	140	94	88	559	696	746	546	24	30	74.5	74.5	20	20	190	384	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	560	610	KK200_M63
K20R 280M4,6,8	A660	-	-	419	457	40	80	70	M20	482	522	550	416	280	1135	1303	170	140	94	88	559	696	746	576	24	30	85	74.5	22	20	190	384	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	560	610	KK200_M63
K20R 315S2	A660	-	-	406	508	44	75	70	M20	554	590	550	416	315	1185	1353	140	140	120	132	639	731	746	546	28	35	79.5	74.5	20	20	216	451	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	KK200_M63
K20R 315S4	A660	-	-	406	508	44	90	70	M24	554	590	550	416	315	1215	1383	170	140		132	639	731	746	576	28	35	95	74.5	25	20	216	451	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	KK200_M63
K20R 315S6,8	A660	-	-	406	508	44	90	70	M24	554	590	550	416	315	1135	1303	170	140		132	559	731	746	576	28	35	95	74.5	25	20	216	371	211	55	KK200_M63	8L	yes	-1	h6	m6	m6	H7	595	610	KK200_M63
K20R 315M2	A660	-	-	457	508	44	75	75	M20	587	590	610	498	315	1270	1448	140	140	120	110	630	774	789	640	28	35	79.5	79.5	20	20	216	495	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	KK400_M63
K20R 315M4,6,8	A660	-	-	457	508	44	90	75	M24	587	590	610	498	315	1300	1478	170	140		110	630	774	789	670	28	35	95	79.5	25	20	216	495	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	KK400_M63
K20R 315M10,12	A660	-	-	457	508	44	90	75	M24	554	590	550	498	315	1135	1303	170	140		132	559	774	789	576	28	35	95	79.5	25	20	216	320	211	55	VGK400	8L	yes	-1	h6	m6	m6	H7	595	610	KK400_M63
K20R 315L2	A660	-	-	508	508	44	75	75	M20	624	590	610	498	315	1390	1568	140	140	120	110	645	774	789	745	28	35	79.5	79.5	20	20	216	564	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	KK400_M63
K20R 315L4,6,8	A660	-	-	508	508	44	90	75	M24	624	590	610	498	315	1420	1598	170	140		110	645	774	789	775	28	35	95	79.5	25	20	216	564	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	KK400_M63
K20R 315LX2	A660	-	-	508	508	44	75	75	M20	624	590	610	481	315	1510	1688	140	140	120	110	765	796	811	745	28	35	79.5	79.5	20	20	216	684	230	55	VIK400T	8L	yes	-1	h6	m6	m6	H7	628	643	VIK400T
K20R 315LX4	A660	-	-	508	508	44	90	75	M24	624	590	610	481	315	1540	1718	170	140		110	765	796	811	775	28	35	95	79.5	25	20	216	684	230	55	VIK400T	8L	yes	-1	h6	m6	m6	H7	628	643	VIK400T
K20R 315LX6,8	A660	-	-	508	508	44	90	75	M24	624	590	610	498	315	1420	1598	170	140		110	645	774	789	775	28	35	95	79.5	25	20	216	564	230	55	VGK400	8L	yes	-1	h6	m6	m6	H7	628	643	KK400_M63

Three-phase motors with squirrel-cage rotor, Transnorm version

with surface ventilation, cooling method IC 411, degree of protection IP 55

Paint finish

Normal finish
- adapted for group of climates ‘moderate‘ acc. to IEC 721-2-1 Weather protected and non-weather protected locations, open-air-conditions, short-time up to 100 % relative air humidity at temperatures up to +30 °C, continuously up to 80 % relative air humidity up to +25 °C.

Finish system
Sizes 56 – 112
- all components except plastic parts (terminal box, fan cover) and aluminium terminal boxes: prime plastic paint, layer thickness ≥ 30 µm
- finish coat water-soluble varnish with layer thickness ≥ 30 µm
- special version 2K-varnish, layer thickness ≥ 30 µm

Sizes 132 - 355
- prime coat plastic resin/zincphosphate, layer thickness ≥ 30 µm
- finish coat 2K-(separate-application)-polyurethane varnish, layer thickness ≥ 30 µm

Special finish
- adapted for group of climates ‘world wide‘ acc. to IEC 721-2-1 Non-weather protected locations, open-air-conditions, in aggressive atmospheres (chemical industries, sea environments) short-time up to 100 % relative air humidity at temperatures up to +35 °C, continuously up to 98 % relative air humidity at temperatures up to +30 °C.

Finish system
Size 56 – 112
- prime plastic paint, layer thickness ≥ 30 µm
- finish coat 2K-varnish with layer thickness ≥ 60 µm

Size 132 - 355
- prime coat plastic resin/zincphosphate, layer thickness ≥ 30 µm
- second coat on separate application base, layer thickness ≥ 30 µm
- finish coat 2K-(separate-application)-polyurethane varnish, layer thickness ≥ 30 µm

Standard colour
RAL 7031 blue-grey

Additional special coating systems
- versions for excessive thermal stresses
- versions for excessive chemical and radiation stresses
- systems on customer’s request

Pole-changing motors

Pole-changing motors are according to the load torque characteristics of driven machines designed for
- drives with a constant load torque and
- drives with a quadratically increasing load torque.

The intended application is stated in the motor selection data list. The motors can only be designed for one operating voltage, e.g. 230 V, 400 V or 660 V and are generally for direct connection via the pole sequence. 60 Hz version and special voltages according to IEC 38 are possible

Pole-changing is achieved by
- two separate windings in the stator, e. g. 6-4 poles
- one winding in a Dahlander circuit, e. g. 8-4 poles
- two separate windings, both in a Dahlander circuit, e. g. 12-8-6-4 poles

Whereas with the winding in a Dahlander circuit it is only possible to have a speed ratio of 1:2, two separate windings offer other speed variations, but with lower outputs in relation to the same basic version.

Y or Δ circuits are used for separate windings, Δ/YY or Y/YY for windings according to the Dahlander principle.

The following circuits are obtained with the individual variations in the number of poles:

Number of poles	Circuit	Basic version[2]
4-2, 4-2L	Δ/YY, Y/YY	4pole[1]
8-4, 12-6	Δ/YY	6pole
8-4L, LF	Y/YY	4pole
6-4	Y/Y, Δ/Δ	6pole
6-4LF, 6-4L	Y/Y, Δ/Δ	4pole
8-4-2	Y/Δ/YY	6pole[1] up to K11R 160M
8-4-2	Y/Δ/YY	4pole[1] up to K11R 160L
8-6-4	Δ/Y/YY	6pole
12-8-6-4	Δ/Δ/YY/YY	6pole

[1] From K21R 132, these motors have the 2pole ventilation system.
[2] not always for K21R 63 – 112

Star-circuit for the highest pole number (lowest speed) is possible, if the operation circuit is Δ. Other pole number combinations are also possible.

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Product overview

Three-phase standard motors
Sizes 56 – 355, IP 55
Squirrel-cage rotor, 0.12 – 500 kW
Slip-ring rotor, 2.2 – 250 kW
Base speeds: 3000, 1500, 1000, 750 rpm

Modifications
- foot-mounted types and flange mounting types
- pole-changing motors with 2, 3 and 4 speeds
- multi-voltage
- mounted star-delta switch
- explsion-protected type in the type of protection EEx e, EEx d and Ex nA
- motors for seagoing vessels
- designs for the dairying
- with forced-ventilation
- design with thermal winding protection
- increased degree of protection up to IP 65 S
- brake motors
- built-in motors 0.06 – 90 kW

Geared motor
- spur wheel back-geared motors
- contrate worm geared motors
- actuating geared motors

Three-phase asynchronous motors
From size 400, IP 55
low voltage design
squirrel-cage rotor and slip-ring rotor from 500 kW
in mechanical and electrical modifications

Single-phase asynchronous motors
Size 56 – 112
Squirrel-cage rotor, IP 55
with working capacitor 0.06 – 2.2 kW

Frequency converters and soft starters for three-phase asynchronous motors
- frequency converters for variable-speed three-phase drives 0.25 – 500 kW
- soft starters for variable-speed three-phase drives 0.75 – 500 kW

Three-phase special motors
- according to international classification rules for the shipbuilding up to 440 kW
- roller table motors up to 160 kW
- energy-optimized three-phase motors up to 315 kW
- motors for converter operation
- energy saving motors, 0.09 – 315 kW
- motors for fire gas and smoke exhausting fans 2.2 – 500 kW

Appliance motors
- Three-phase motors for special applications
- built-in motors, e.g. for refrigerating compressors

Three-phase asynchronous generators
- 2.2 – 420 kVA

Packaged drives
Size 80 – 180, in self-ventilated and forced-ventilated design
with voltage/frequency control up to 7.5 kW field-oriented controlled 5.5 to 22 kW

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