
Flat motors for higher speeds

Router motors

Rectangular motors, ventilated

Rectangular motors, non-ventilated

type of protection IP 54

CSA version possible

General

This list shows a range of three-phase asynchronous special motors with squirrel cage rotors of various designs for higher rotating speeds.

These high speed special motors are used mainly for chip removing machining of plastics, wood and metal. In order to ensure higher rotating speeds of three-phase motors with squirrel cage rotors it is necessary to use higher frequencies than those in the main supply.

These motors are distinguished from standard motors of the same rating by shafts and deep groove ball bearings of greater strength. The reinforced bearing systems make it possible to use the shaft ends for direct mounting of collets, drill chucks, profile cutter heads, etc.

Motor models

Flat motors for higher rotating speeds

Motors will be delivered in many different electrical and mechanical executions. The flat motors can be built either with low height of axles (series KN, KC) or for narrow axle distances in slim motor designs (series KR).

Router motors

An internal taper in the shaft for different collet systems makes it possible to hold routing cutters with cylindrical tool shank. A double bearing arrangement on the tooling side of the motor is recommended for use on modern working machines and provides a higher radial loading capacity, brilliant running accuracy and is play free in axial direction.

Rectangular motors

Three-phase flat motors of especially slim, rectangular shape.

The very slim form ensures that motors can be installed close to each other, in which small centre distances can be achieved depending on the required rating and the types used.

The rectangular motors can also be supplied as non-ventilated models. Non-ventilated motor models are characterised by reduced running noise because no fan is installed.

Tool holding

Within the range of the available shaft diameters – d_{max} – (see tables for dimensions) the following models are possible:

- cylindrical shaft for fixing tools with central bore, external thread for nut or internal thread and washer for tool clamping
- shaft with saw flanges for fixing thin flat tools (e. g. saw blades)
- external taper
- internal taper with external thread for holding collets (for possible diameter please see drawings respectively table on page 8), please observe rotating direction
- quick clamping systems, e.g. Leuco PS-System or ETP HydroGrip, see pages 20/21
- for hydro clamp chuck with especially high running accuracy
high precision motor, see page 16

Balancing

Careful dynamic balancing of the motors ensures a quiet running of the motor in spite of high rotating speeds. The motors are normally balanced to vibration speed $V_{eff} < 1.8 \text{ mm/s}$.

For operation with tool the balancing of the whole system is very important especially for the lifetime of the bearings. Therefore, the use of balanced tools is necessary.

Normally, full key balancing is agreed, i. e. complete key, inserted the shaft is marked with "F". The tools have to be executed accordingly.

Three-phase motors will be connected to the three supply lines L1, L2 and L3. The rated voltage must be conform with the voltage on the lines of the power supply (operating voltage).

The operating connection of the motor, directly started, can be star- or delta-connection, if the motors shall be star-delta started than the operating

connection delta has to be ensured.

Motors with winding specification 230 V Δ /400 VY can be directly switched on if the connection on the terminal board is 230 (220) V, or 400 V accordingly. The operating frequency has to be observed.

Connection of three-phase motors

The motors have a sufficient dimensioned terminal box. Its position is to be fixed according to paragraph "Motor Selection Criteria", page 5

"mechanical design".

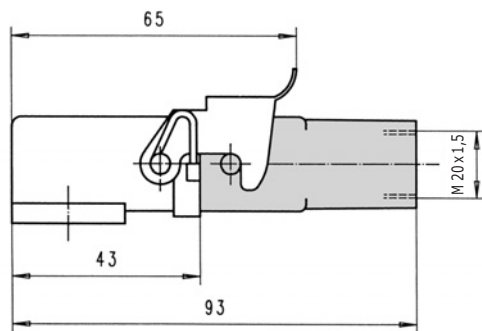
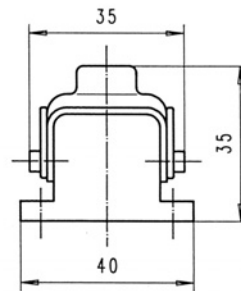
The drawings show terminal boxes in standard version.

Terminal box

The motors can be made with plug in order to provide a quick facilities connection. We offer a plug which is conform to the EMV rules. Motors of the series K 20, K35 and K 50 as well as V 30 to V 60 are available as standard models with plug.

Plugs for bigger motors on request. Please consider that only one connection is possible (star or delta). A connection of thermistors is possible as well.

Plug



It is recommended to specify on inquiry the application, rating and rotating speed.

On inquiries for special shaft ends we ask you to send us a sketch.

The electrical datas given in each column of a selection table refer to special specification of the motors to this point and are therefore valid only for the stated constant frequency.

For variable speed please inquire.

Most motor types are available according to the CSA-standards on inquiry (file no. L.R. 16 865).

In case of repair please consider that special bearings are used with special greases. Standard bearings must not be used. These special bearings are available from our service department but it is recommended to carry out any repairs by our qualified specialists. On this occasion the condition of balance will always be checked.

Important note

Notice has to be given:

If static frequency converters are used to feed the high speed motors, insulation class "F" has to be employed. The converter has to be adopted to the motor. EMV rules have to be observed.

For operation on a static inverter a good sine wave form has to be available. It might be necessary to use reactors or filters. Please refer to VDE 0530 part 17 / DIN IEC/TS 60034-17.

For operation on an inverter on the rating frequency of the motor the available torque is smaller than on sine wave voltage because of the temperature rise caused by additional losses. The reducing factor varies at rated frequency between 0 and 20 % (see rule DIN IEC/TS 60034-17).

Static Frequency Converters

High Speed Three Phase Special Motors Flat Motors



Selection table for higher speeds up to 24,000 rpm

type of protection IP 54

Special versions for working of wood and plastic etc., for routing, milling, sawing, drilling and cutting, flat housing, external rip cooling, reinforced shaft, special ball bearings of higher running accuracy.

frequencies: 50 – 400 Hz, small motors up to 500 Hz (on request), voltage 400 V, special voltage on request

designs: IM B3, IM V5, IM V6

output rating: for insulation class "F"

special shaft ends according to specification within the limits $d_{\max}$ available.

The motor types with additional mark "D" are fitted with double bearings on the driving side for an axial play free shaft. The types KN/KC 50 up to 72 are available at maximum 7200 rpm with an integrated electromechanical brake, see page 33.

Output in kVA for determination of the frequency converter

frequency speed (synchronous)		50 Hz 3,000 rpm	100 Hz 6,000 rpm	150 Hz 9,000 rpm
type	weight * (ca. kg)	rating (kW)	rating (kW) (kVA)	rating (kW) (kVA)
K. 35.1-2	4,0	–	0,30 0,70	0,50 1,00
K. 35.3-2	4,8	–	0,45 1,00	0,70 1,40
K. 35.5-2	5,8	0,25	0,60 1,30	1,00 1,90
K. 35.7-2	6,2	0,30	0,75 1,60	1,10 2,00
K. 35.9-2	7,2	0,35	0,90 1,90	1,40 2,70
K. 50.11-2	11,0	0,80	1,80 3,00	2,50 3,80
K. 51.14-2	12,5	1,10	2,40 3,60	3,50 5,00
K. 52.16-2	13,5	1,20	2,70 4,00	4,00 5,80
K. 60.09-2	14,5	1,80	2,70 4,00	– –
K. 61.11-2	17,0	2,20	3,30 4,90	– –
K. 61.13-2	19,5	2,60	4,00 5,80	5,00 7,00
K. 62.15-2	20,5	3,00	4,60 6,60	5,50 7,50
K. 62.18-2	22,0	3,50	5,50 8,00	6,00 8,50
K. 70.12-2	26,0	3,00	5,20 7,00	5,50 7,50
K. 71.16-2	33,0	4,40	6,60 9,00	7,00 10,00
K. 71.20-2	38,0	5,50	8,00 11,00	9,00 12,00
K. 72.24-2	45,0	7,00	11,00 15,00	11,00 15,00
K. 72.28-2	51,0	7,50	12,50 17,00	13,00 18,00
K. 80.19-2	56,0	6,60	11,00 14,00	– –
K. 81.26-2	69,0	9,20	16,00 20,00	– –
K. 82.31-2	79,0	11,00	18,00 23,00	– –
K. 83.37-2	91,0	15,00	25,00 32,00	– –

frequency speed (synchronous)		200 Hz 12,000 rpm	300 Hz 18,000 rpm	400 Hz 24,000 rpm
type	weight * (ca. kg)	rating (kW) (kVA)	rating (kW) (kVA)	rating (kW) (kVA)
K. 21.05-2	1,8	0,20 0,40	0,32 0,65	0,40 0,75
K. 22.08-2	2,1	0,32 0,62	0,50 1,00	0,60 1,10
K. 23.10-2	2,9	0,40 0,78	0,60 1,20	0,70 1,30
K. 35.1-2	4,0	0,70 1,20	0,90 1,60	1,00 1,60
K. 35.3-2	4,8	1,00 1,80	1,30 2,30	1,40 2,20
K. 35.5-2	5,8	1,40 2,40	1,90 3,30	2,00 3,10
K. 35.7-2	6,2	1,60 2,80	2,20 3,80	– –
K. 35.9-2	7,2	2,00 3,40	– –	– –
K. 50.09-2	10,0	2,30 3,50	3,20 4,70	– –
K. 50.11-2	11,0	3,00 4,50	4,00 5,80	– –
K. 51.14-2	12,5	4,00 5,70	5,00 7,20	– –
K. 52.16-2	13,5	4,50 6,50	– –	– –
K. 61.13-2	19,5	6,00 8,00	7,00 9,50	– –
K. 62.15-2	20,5	6,50 8,70	– –	– –
K. 62.18-2	22,0	7,00 9,50	– –	– –
K. 70.12-2**	28,0	6,00 8,50	7,50 10,00	– –
K. 71.16-2**	35,0	8,00 11,00	10,00 13,50	– –
K. 71.20-2**	40,0	10,00 14,00	12,00 16,00	– –

		6,000 rpm	9,000 rpm
K. 51.14-4	12,5	2,50 4,60	3,00 5,20
K. 61.13-4	19,5	3,00 5,20	3,70 6,70

* weight is valid for standard version, possible modifications in weight e. g. because of version with shaft and double bearing arrangement

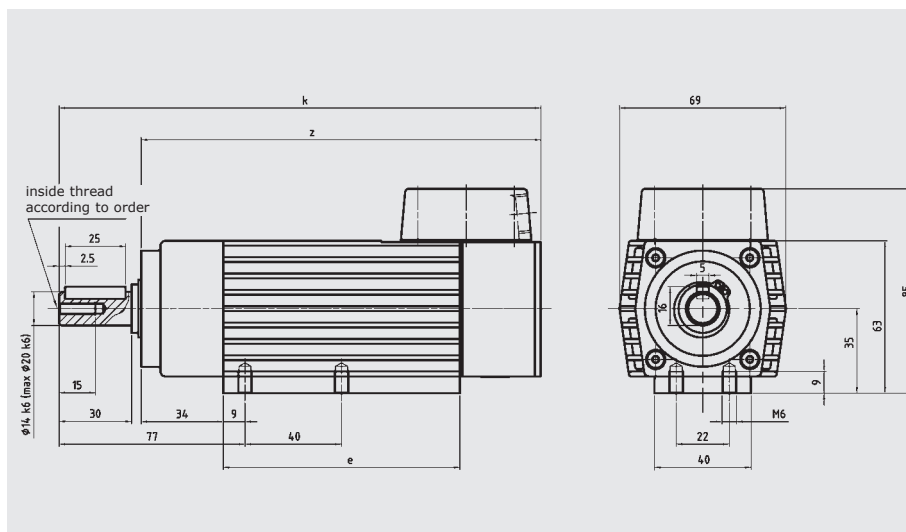
** speeds up to 18,000 rpm as KNO-model

With the second letter the basic motor types are defined. It is selected from our modular design system. Dimensions are given on the following pages.

type: KN 20

drawing No. MS 151

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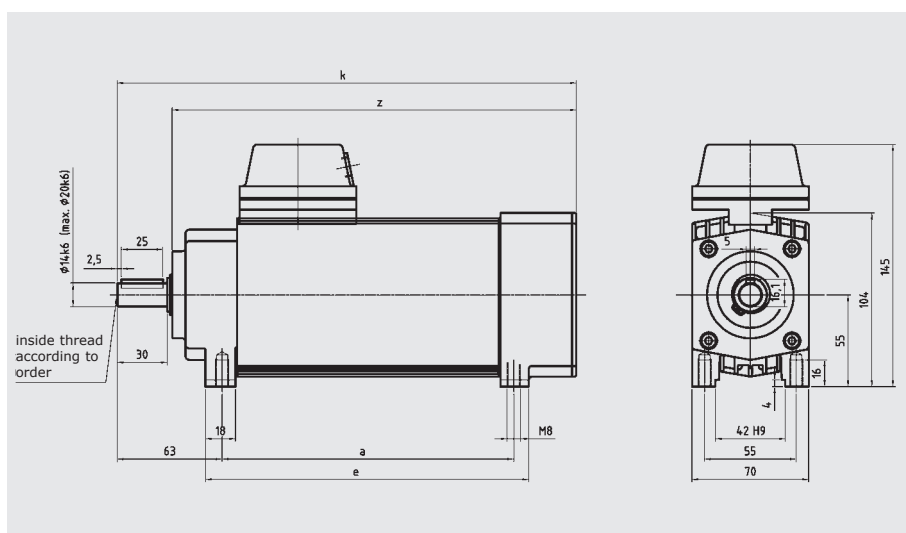


type	e	k	z
KN 21.05	98	200	166
KN 22.08	133	235	201
KN 23.10	153	255	221

type: KR 35

drawing No. MS 3746

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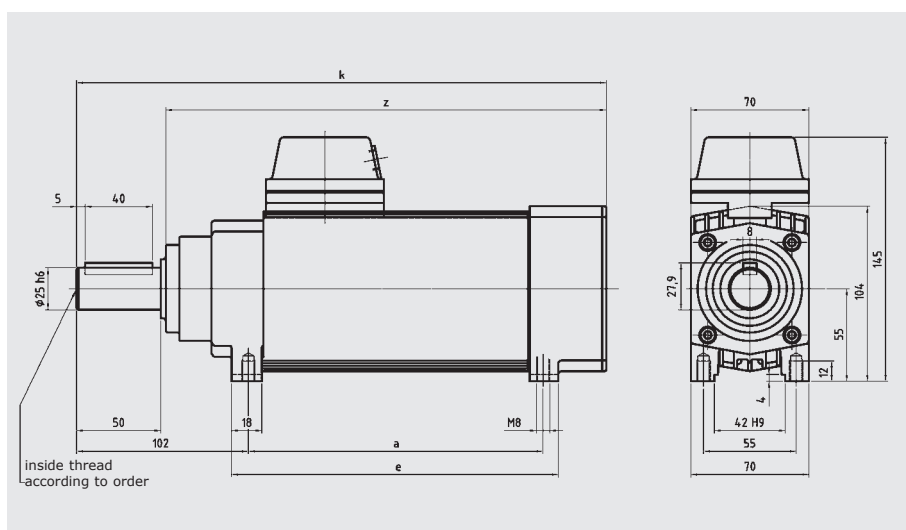


type	a	e	k	z
KR 35.1	145	165	245	212
KR 35.3	175	195	275	242
KR 35.5	215	235	315	282
KR 35.7	235	255	335	302
KR 35.9	275	295	375	342

type: KR 35 D

drawing No. MS 3772

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type	a	e	k	z
KR 35.1 D	145	165	284	231
KR 35.3 D	175	195	314	261
KR 35.5 D	215	235	354	301
KR 35.7 D	235	255	374	321
KR 35.9 D	275	295	414	361

High Speed Three Phase Special Motors

type of protection IP 54

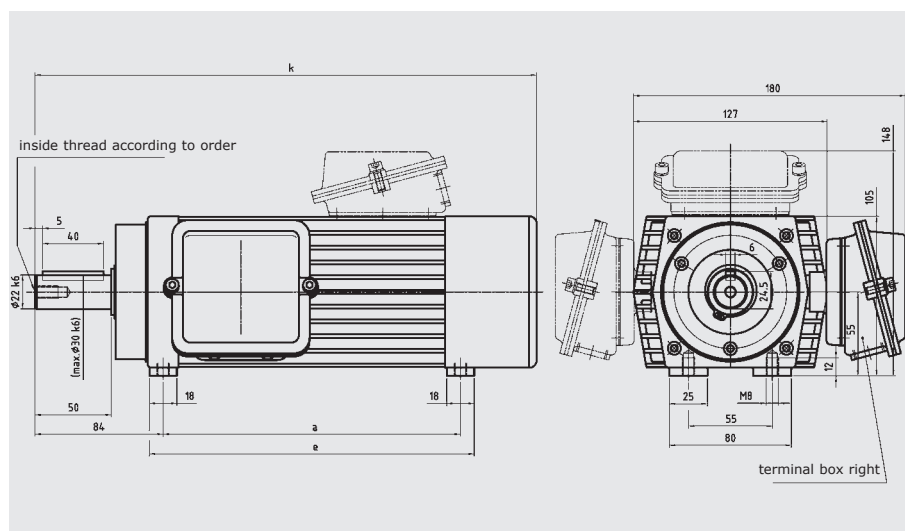


type: KN 50

drawing No. MS 170A

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type	a	e	k
KN 50	195	213	330
KN 51	225	243	360
KN 52	245	263	380

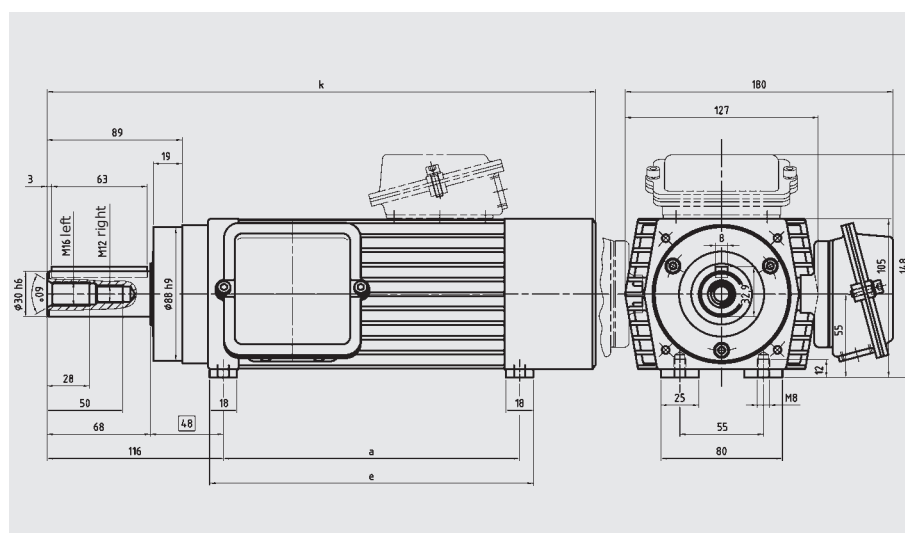


type: KN 50 D

drawing No. MS 4046

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type	a	e	k
KN 50 D	195	213	361
KN 51 D	225	243	391
KN 52 D	245	263	411

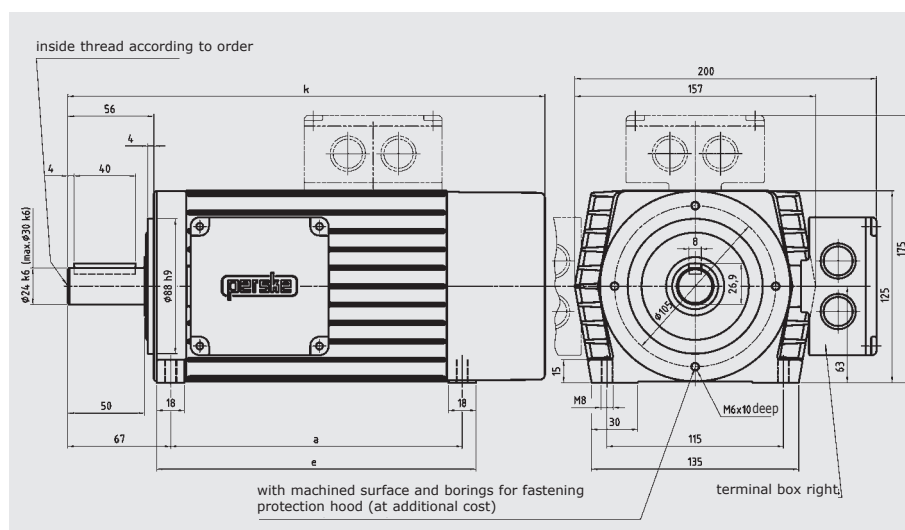


type: KN 60

drawing No. MS 170B

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type	a	e	k
KN 60	190	210	311
KN 61	220	240	341
KN 62	270	290	391



dimensions subject to change



type	a	e	k
KN 60 D	190	210	361
KN 61 D	220	240	391
KN 62 D	270	290	441



type	a	e	k
KC 70	260	310	415
KC 71	340	390	495
KC 72	420	470	575



type	a	e	k
KC 70 D	260	315	432
KC 71 D	340	395	512
KC 72 D	420	475	592

type of protection IP 54

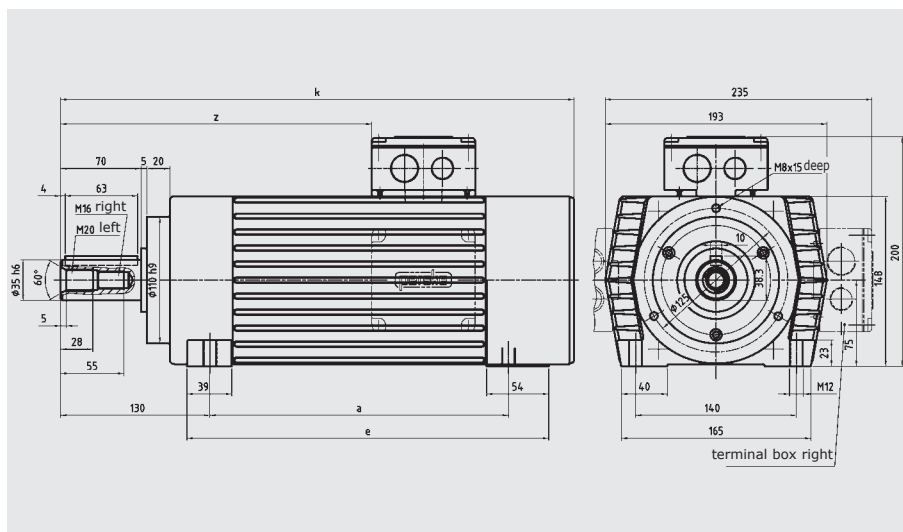


type: KCS 70 D

drawing No. MS 182 - 5

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type	a	e	k	z
KCS 70 D	260	315	447	271
KCS 71 D	340	395	527	351
KCS 72 D	420	475	607	431



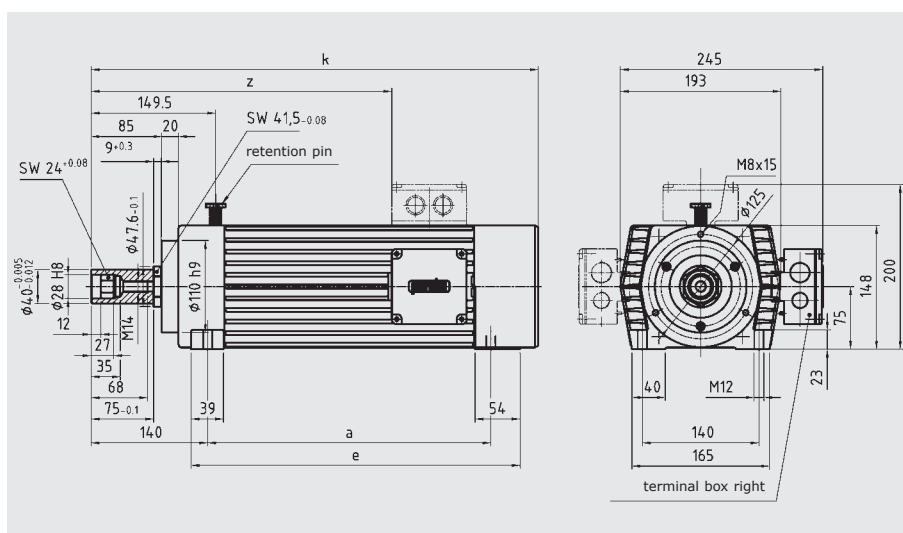
type: KCS 70 D

drawing No. MS 182-A191

high precision motor for
hydro clamping tools

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type	a	e	k	z
KCS 70 D	260	315	458	281
KCS 71 D	340	395	538	361
KCS 72 D	420	475	618	441

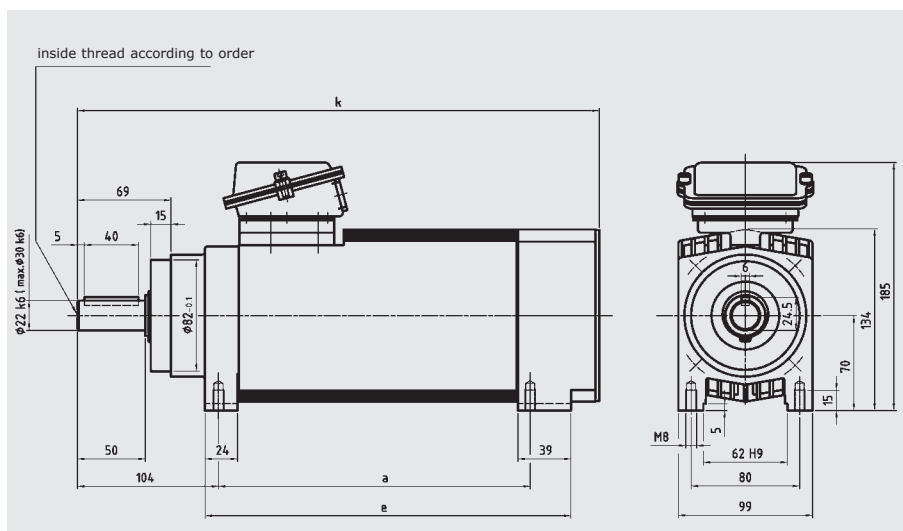


type: KR 50 D

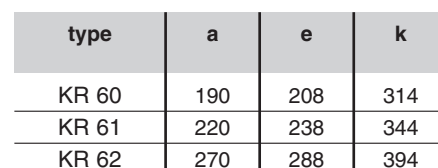
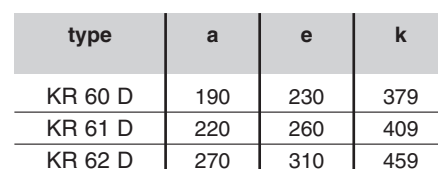
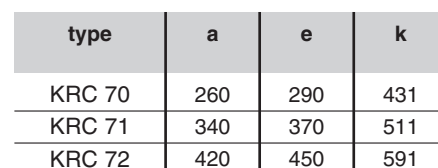
drawing No. MS 161

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type	a	e	k
KR 50 D	200	240	355
KR 51 D	230	270	385
KR 52 D	250	290	405



dimensions subject to change



High Speed Three-Phase Router Motors

with play free double bearing for cylindrical shaft tools

type of protection IP 54



General

Long experience in the field of high speed routing have led to the development of these compact router motors whose strong router spindles, which also carry the robust squirrel cage rotor of the electric motor, takes collets up to 25 mm diameter.

The robust bearing shields have an adjustment nut between the feet for precise fitting on the machine support.

The dust hood can be fixed easily by borings and centering on the tooling side of the motor.

Bearing

The shaft end is held play free in axial and radial direction by a precise spindle bearing arrangement. This robust as well as precise bearing arrangement makes the motor more resistant against small unbalances of the tools used.

This new bearing arrangement with its higher axial and radial loading capacity is favourable for the use on modern working machines (e. g. CNC controlled machines) with their high feed speed and the stronger thrust with diamond tools.

Motor of the series KNO are available with hybrid bearings.

Due to using bearings greased for lifetime the motors are free of maintenance and easier to handle.

Cooling

The motors are self-ventilated by a built-in fan. This fan works at the operating speed of the motor and makes it self-contained, independent of external cooling means.

The noise is limited by the form of the fan and the cooling-air-flow-guides. In special cases external cooling arrangements can be fitted.

Tool mounting

The motors are normally designed for collets (2...25 mm). Attention: only one rotating direction is allowed. Motors with hydro tool clamping systems are distinguished by a reinforced running accuracy,

saver tool clamping and easier handling. Additional, these motors can be used for left-hand and right-hand rotation.

type	rating continuous S1 at			max. collet capacity (mm)	drawing MS	weight (kg)
	150 Hz (kW) 9.000 rpm	200 Hz (kW) 12.000 rpm	300 Hz (kW) 18.000 rpm			
KRS 35.1-2 D **	0,50	0,70	0,90	13	3870	4,5
KRS 35.3-2 D **	0,70	1,00	1,30	13	3870	5,3
KRS 35.5-2 D **	1,00	1,40	1,90	13	3870	6,3
KRS 35.7-2 D	1,10	1,60	2,20	13	3870	6,7
KRS 35.9-2 D	1,40	2,00	—	13	3870	7,7
KRS 50.09-2 D	2,00	2,30	3,20	16	161-11	10,0
KRS 50.11-2 D	2,50	3,00	4,00	16	161-11	11,5
KRS 51.14-2 D	3,50	4,00	5,00	16	161-11	13,0
KRS 52.16-2 D	4,00	4,50	—	16	161-11	14,0
KRSV 51.14-2 D	3,00	4,00	5,00	25	MS 164	13,5
KRSV 51.14-2 D *	3,00	4,00	5,00	25	MS 164-7	14,5
KRS 61.13-2 D	5,00	6,00	7,00	20	3903	19,5
KRS 62.15-2 D	5,50	6,50	—	20	3903	20,5
KRS 62.18-2 D	6,00	7,00	—	20	3903	22,0
KRSV 61.13-2 D	5,00	6,00	7,00	25	3635	20,0
KRSV 61.13-2 D *	5,00	6,00	7,00	25	3757	21,5
KNOC 70.12-2 D **	4,80	6,00	7,50	20	181 A-8	28,0
KNOC 71.16-2 D **	6,50	8,00	10,00	20	181 A-8	35,0
KNOC 71.20-2 D **	8,00	10,00	12,00	20	181 A-8	40,0
KNO 70.12-2 D	4,80	6,00	7,50	25	181 A-2	30,0
KNO 71.16-2 D	6,50	8,00	10,00	25	181 A-2	37,0
KNO 71.20-2 D	8,00	10,00	12,00	25	181 A-2	42,0
KNO 70.12-2 D *	4,80	6,00	7,50	25	181-14	31,0
KNO 71.16-2 D *	6,50	8,00	10,00	25	181-14	38,0
KNO 71.20-2 D *	8,00	10,00	12,00	25	181-14	43,0

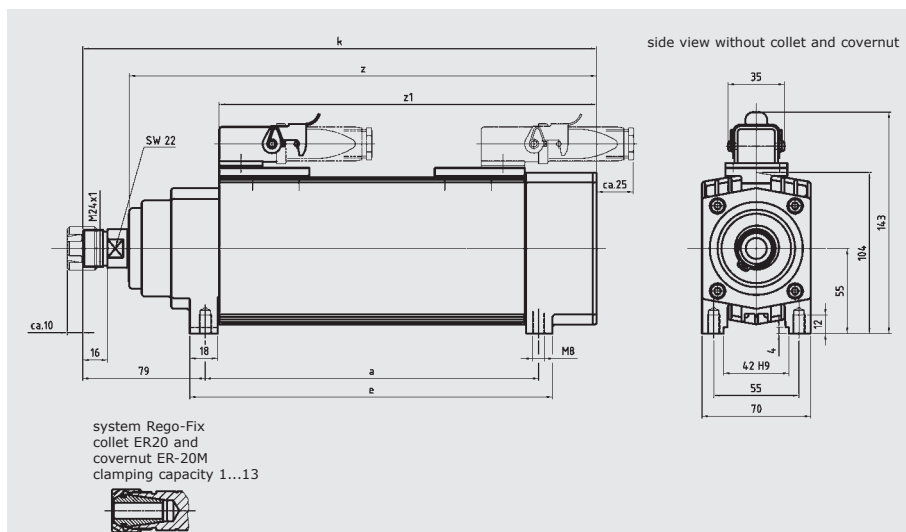
* special version for hydro clamping collet chuck

** the special version goes up to 22.000 rpm

For operation on a static inverter a good sine wave form should be available.

It might be necessary to use reactors or

filters. Refer to VDE 0530 part 17 / DIN IEC/TS 60034-17.

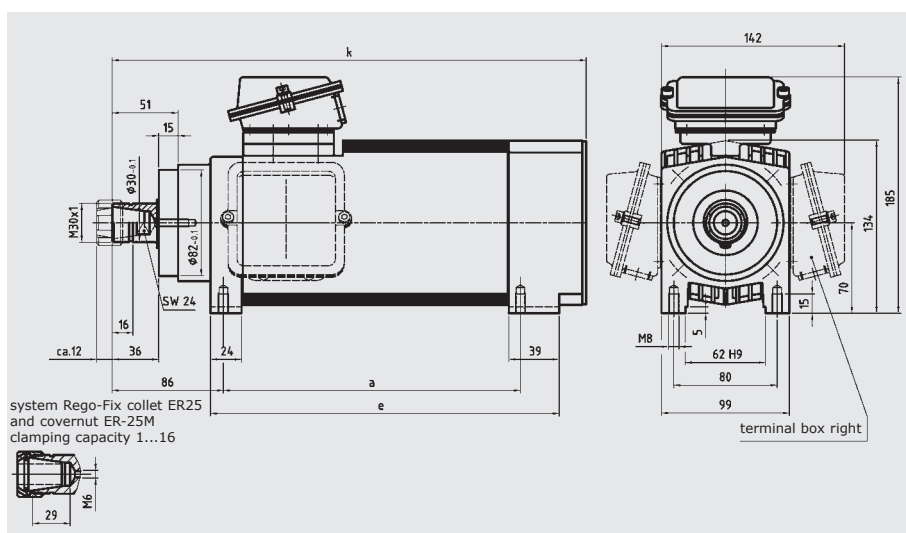


type: KRS 35 D

drawing No. MS 3870

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type	a	e	k	z	z ₁
KRS 35.1 D	145	165	261	231	173
KRS 35.3 D	175	195	291	261	203
KRS 35.5 D	215	235	331	301	243
KRS 35.7 D	235	255	351	321	263
KRS 35.9 D	275	295	391	361	303

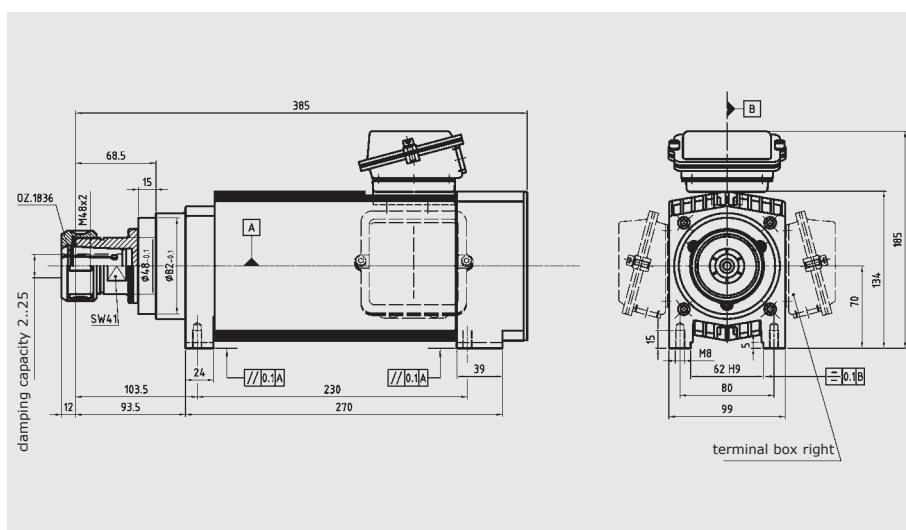


type: KRS 50 D

drawing No. MS 161-11

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type	a	e	k
KRS 50 D	200	240	337
KRS 51 D	230	270	367
KRS 52 D	250	290	387



type: KRSV 51.14 - 2 D

drawing No. MS 164

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High Speed Three-Phase Router Motors

with play free double bearing for cylindrical shaft tools

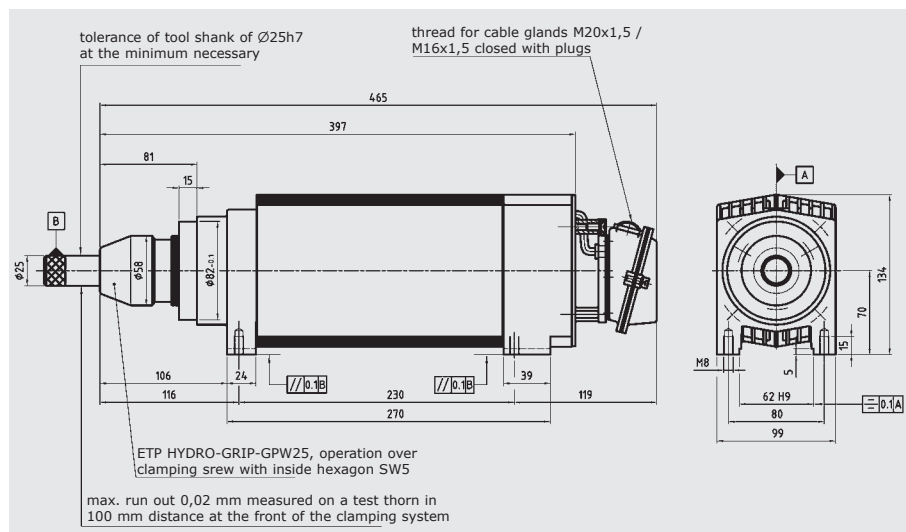
type of protection IP 54



type: KRSV 51.14 - 2 D

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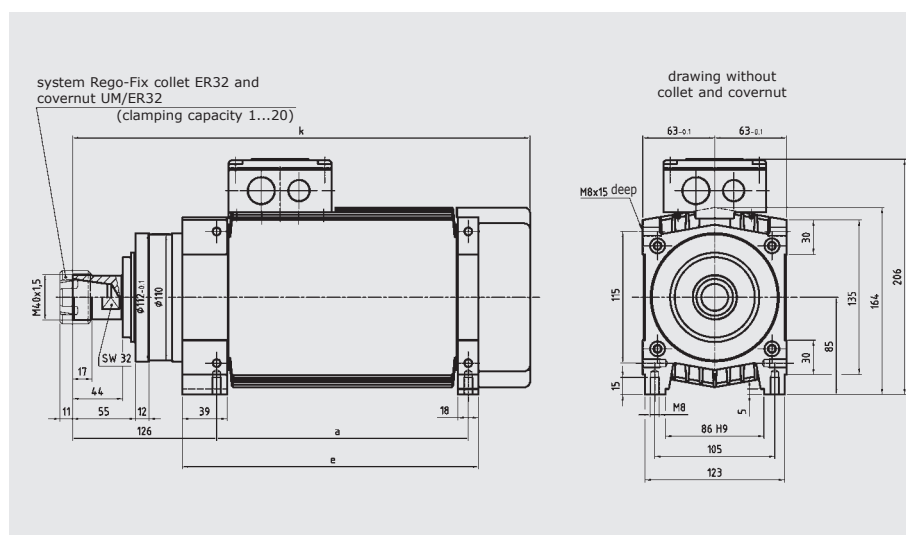


type: KR 60 D

drawing No. MS 3903

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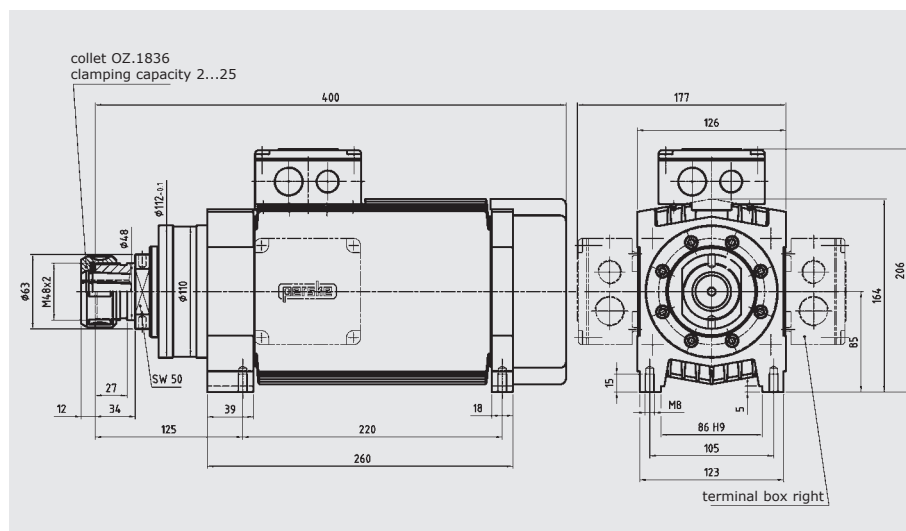
type	a	e	k
KR 60 D	190	230	370
KR 61 D	220	260	400
KR 62 D	270	310	450



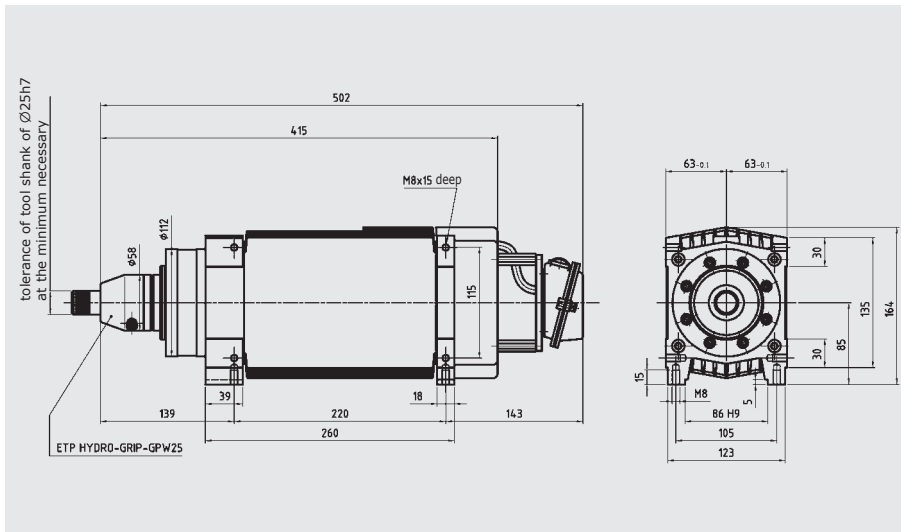
type: KRSV 61.13 - 2 D

drawing No. MS 3635

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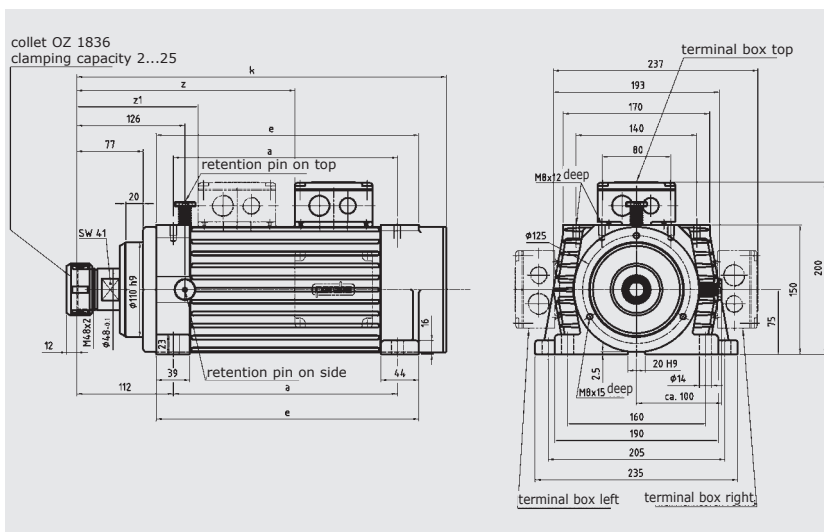
dimensions subject to change



type: KRSV 61.13 - 2 D

drawing No. MS 3757

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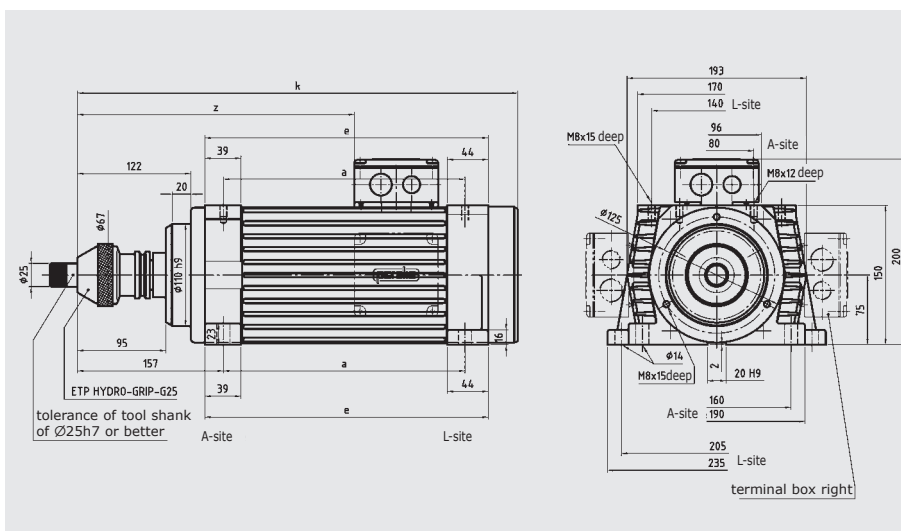


type: KNO 70 D

drawing No. MS 181A2

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type	a	e	k	z	z1
KNO 70 D	260	305	429	253	141
KNO 71 D	340	385	509	333	221



type: KNO 70 D

drawing No. MS 181-14

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type	a	e	k	z
KNO 70 D	260	305	474	298
KNO 71 D	340	385	554	378

Three-Phase Rectangular Motors

type of protection IP 54



with squirrel cage rotor
slim, rectangular shape, reinforced shaft
special bearings of higher running accuracy
labyrinth seals at both ends
self-ventilated output rating for insulation class "F",
voltage: 400 V
special voltage on request
frequency: 50-400 Hz (500 Hz on request)

designs: IM B3, IM B5, IM V6
The design allows very small axle distances.

* Rating in kVA for calculation of frequency converter

rectangular motor

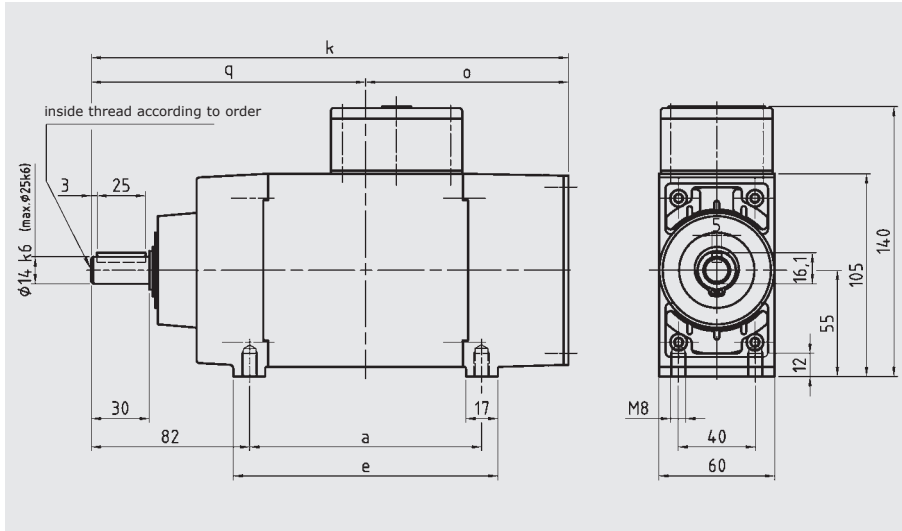
frequency speed (synchronous)	drawing MS	weight (ca. kg)	50 Hz 3,000 rpm		100 Hz 6,000 rpm		150 Hz 9,000 rpm	
type			rating (kW)	*(kVA)	rating (kW)	*(kVA)	rating (kW)	*(kVA)
V 30.06-2	132	2,7	—	—	0,20	0,50	0,30	0,60
V 31.09-2	132	3,4	—	—	0,30	0,70	0,45	0,85
V 50.09-2	113 A	8,5	0,55	1,00	1,00	1,70	1,50	2,60
V 51.20-2	113 A	16,0	1,25	2,10	2,00	3,00	—	—
V 60.11-2	113 B	15,0	1,40	2,30	2,20	3,30	3,00	4,40
V 61.15-2	113 B	18,5	2,00	3,20	3,00	4,20	4,00	6,00

frequency speed (synchronous)	drawing MS	weight (ca. kg)	200 Hz 12,000 rpm		300 Hz 18,000 rpm		400 Hz 24,000 rpm	
type			rating (kW)	*(kVA)	rating (kW)	*(kVA)	rating (kW)	*(kVA)
V 30.06-2	132	2,7	0,42	0,80	0,60	1,00	0,65	1,10
V 31.09-2	132	3,4	0,65	1,20	0,90	1,50	1,00	1,70
V 50.09-2	113 A	8,3	1,00	1,70	1,10	1,80	1,50	2,50
V 50.09-2	113 A	8,5	1,85	3,10	2,20	3,50	3,00	4,60
V 60.11-2	113 B	15,0	3,70	5,20	4,40	6,60	4,40	7,00
V 60.11-2	113 B	16,0	4,00	5,60	5,00	7,00	5,00	7,50
V 61.15-2	113 B	18,5	5,00	7,00	—	—	—	—

rectangular motor, non-ventilated, without own ventilator, very silent

frequency speed (synchronous)	drawing MS	weight (ca. kg)	50 Hz 3,000 rpm		100 Hz 6,000 rpm		150 Hz 9,000 rpm	
type			rating (kW)	*(kVA)	rating (kW)	*(kVA)	rating (kW)	*(kVA)
VU 50.09-2	123 A	7,8	—	—	—	—	0,44	0,75
VU 50.09-2	123 A	8,0	0,25	0,50	0,45	0,80	0,55	0,95
VU 60.11-2	123 B	15,5	1,00	1,50	1,70	2,20	1,90	2,60
VU 61.15-2	123 B	18,0	1,30	1,90	2,30	3,00	2,60	3,60

frequency speed (synchronous)	drawing MS	weight (ca. kg)	200 Hz 12,000 rpm		300 Hz 18,000 rpm		400 Hz 24,000 rpm	
type			rating (kW)	*(kVA)	rating (kW)	*(kVA)	rating (kW)	*(kVA)
VU 50.09-2	123 A	7,8	0,60	1,00	0,80	1,30	0,80	1,30
VU 50.09-2	123 A	8,0	0,80	1,30	1,00	1,60	1,00	1,60
VU 60.11-2	123 B	15,5	2,10	2,80	2,60	3,60	2,60	3,60
VU 61.15-2	123 B	18,0	2,80	3,80	—	—	—	—

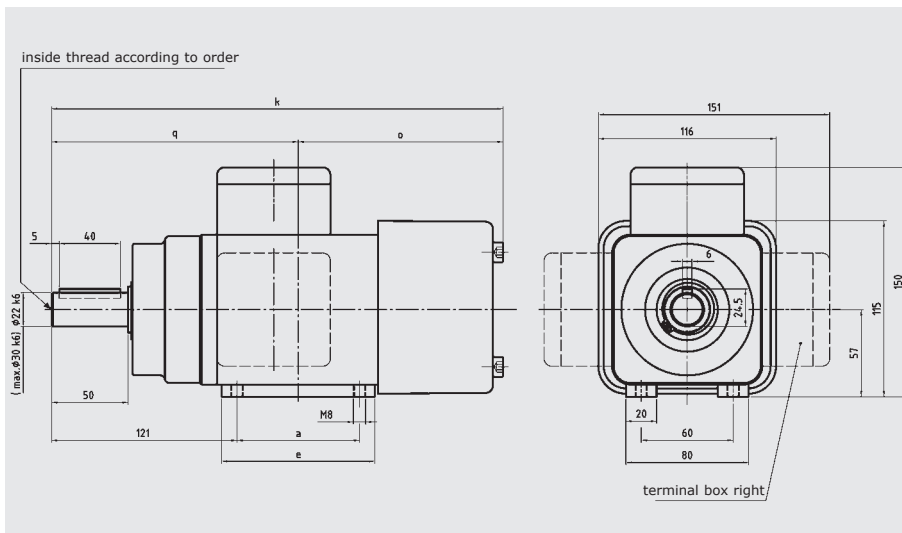


type: V 30

drawing No. MS 132

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type	a	e	k	o	q
V 30	90	108	217	90	127
V 31	120	138	247	105	142

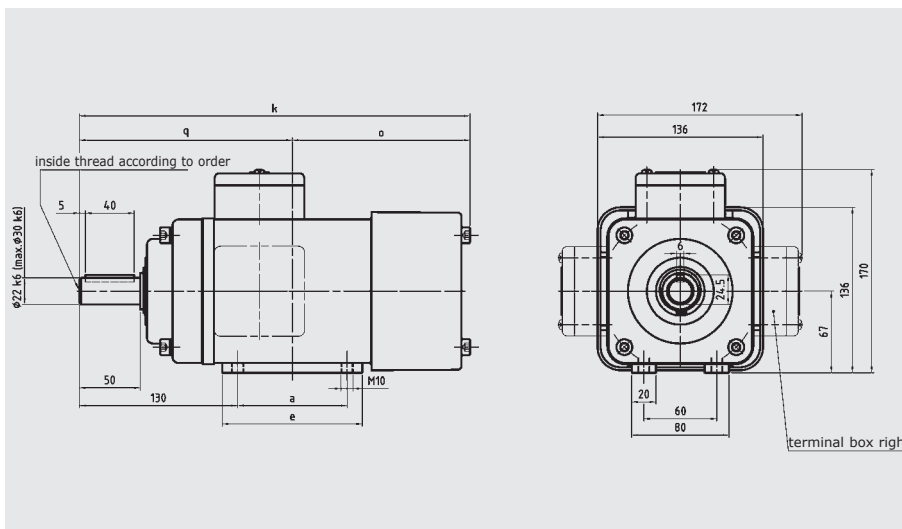


type : V 50

drawing No. MS 113 A

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type	a	e	k	o	q
V 50	80	100	297	136	161
V 51	190	210	407	191	216



type: V 60

drawing No. MS 113 B

[download drawing](#)

type	a	e	k	o	q
V 60	90	115	320	145	175
V 61	130	155	360	165	195

Three-Phase Rectangular Motors

type of protection IP 54

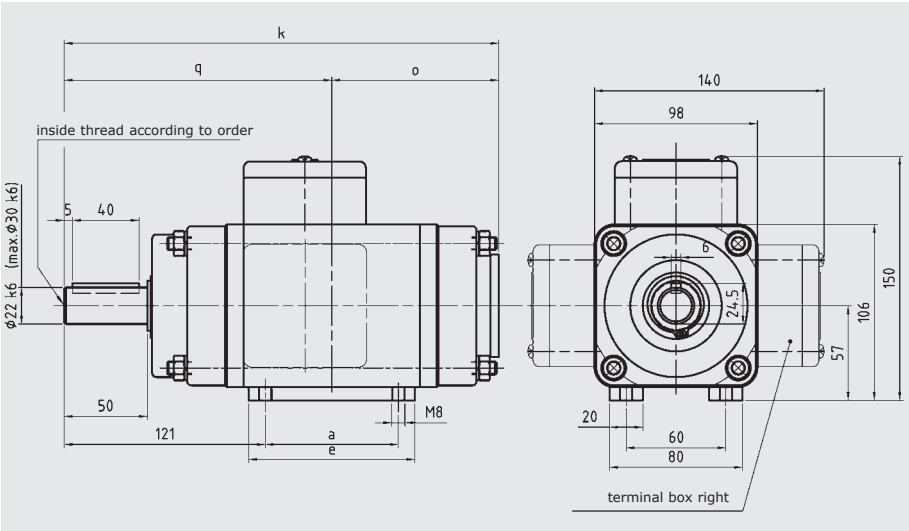


type: VU 50

drawing No. MS 123 A

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type	a	e	k	o	q
VU 50	80	100	262	101	161
VU 51	190	210	372	156	216



type: VU 60

drawing No. MS 123 B

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type	a	e	k	o	q
VU 60	90	115	290	115	175
VU 61	130	155	330	135	195

