

Technical explications

Squirrel-cage motors, increased safety type of protection „e“

Constructive version

Series	K11R / KPER / K12R
Sizes	63 - 355
Degrees of protection	IP 54, IP 55, IP 56, IP 65 according to DIN VDE 0530-5: 1988
Type of cooling	IC 411 according to DIN EN 60034-6: 1996
Types of construction	IM B3, IM B35, IM B5 and derived types of construction according to DIN EN 60034-7: 1996

When mounting motors with vertical shaft position, there is to be prevented the ingress of foreign bodies into the vent holes.

Design for potentially explosive atmospheres according to apparatus group II, category 2 acc. to
DIN EN 50 014:1994 (DIN VDE 0170/0171 part 1) General Provisions
DIN EN 50 019:1996 (DIN VDE 0170/0171 part 6) Increased Safety „e“

Temperature class T1 to T3

Fixing dimensions and coordination between output and dimensions according to DIN 42673 page 2 or DIN 42677 page 2

Ambient temperatures -40°C to +40°C

The construction of the motors is tested through the Physikalisch-Technische Bundesanstalt (PTB) Braunschweig and approved with the following partial certificates:

- Partial certificate PTB no. Ex-95.D.3020 U with the respective supplements
- Partial certificate PTB no. Ex-95.D.3162 U with the respective supplement
- Partial certificate PTB no. Ex-95.D.3021 U with the respective supplements
- Partial certificate PTB no. Ex-93.C.3059 U with the respective supplements
- Partial certificate PTB no. Ex-90.C.3152 U with the respective supplements.

Furthermore, the series are tested through the Schweizerischer Elektrotechnischer Verein
certificate A. no. 97.1 10387.01

and approved through the Schweizer Eidgenössische Starkstrominspektorat (Swiss Confederate Power Current Inspectorate)
approval no. 98.5 51477.01, 95.1 11107.07.

The reports on the test for intended use in hazardous areas are available. The certificates of conformity and the EC certificates of sample test issued for the individual types are to be taken from the approval summary.

Squirrel-cage motors, flame-proof enclosure type of protection EEx de/d

Series	K81R / K82R
Sizes	56 - 355
Degrees of protection	IP 54, IP 55, IP 56 according to DIN VDE 0530-5: 1988
Type of cooling	IC 411 according to DIN EN 60034-6: 1996
Types of construction	IM B3, IM B35, IM B5 and derived types of construction according to DIN EN 60034-7: 1996

When mounting motors with vertical shaft position, there is to be prevented the ingress of foreign bodies into the vent holes.

Design for potentially explosive atmospheres according to apparatus group II, category 2 acc. to
DIN EN 50 014:1994 (DIN VDE 0170/0171 part 1) General Provisions
DIN EN 50 018:1994 (DIN VDE 0170/0171 part 5) Flame Proof Enclosure Type of Protection „d“

Temperature class T3 to T6

Fixing dimensions and coordination between output and dimensions according to DIN 42673 page 3 or DIN 42677 page 3

Ambient temperatures -20°C to +60°C

The construction of the motors is tested through the Physikalisch-Technische Bundesanstalt (PTB) Braunschweig and approved with the following EC certificates of sample test:

- Partial certificate PTB no. PTB 99 ATEX 1098, EExdIICT3 - T6, EEx de T3 - T6

Squirrel-cage motors, type of protection „n“ according to IEC report 79-15 (1987)

Series	K11R / KPER / K12R
Size	63 - 355
Degrees of protection	IP 54, IP 55, IP 56, IP 65 according to DIN VDE 0530-5: 1988
Type of cooling	IC 411 according to DIN EN 60034-6: 1996

Fixing dimensions and coordination between output and dimensions according to DIN 42673 page 1 or DIN 42677 page 1
Types of construction IM B3, IM B35, IM B5 and derived types of construction according to DIN EN 60034-7: 1996

When mounting motors with vertical shaft position, there is to be prevented the ingress of foreign bodies into the vent holes.

Design for potentially explosive atmospheres according to apparatus group II, category 3 acc. to IEC report 79-15 (1987)
Temperature class T3 or T4
Ambient temperatures -40°C to +55°C

For K11R are available the EC certificates of sample test IBExU994TEX 1094 and 1095, for KPER are available the EC certificates of sample test PTB no. Ex-.96.Y.3725U, EX-96.Y.3726.

Furthermore, the series are tested through the Schweizerischer Elektrotechnischer Verein and approved through the Schweizer Eidgenössisches Starkstrominspektorat (Swiss Confederate Power Current Inspectorate)

Certificate A. no. 95.1 11108.03
Approval no. 95.1 11108.04.

Squirrel-cage motors for being used in case of potentially inflammable dusts (zone 21, 22)

Design for zone 21

Series KPER / K11Q
Sizes 56 - 280 (315 in preparation)
Degree of protection IP 65 according to DIN VDE 0530-5: 1988
Type of cooling IC 411 according to DIN EN 60034-6: 1996
Types of construction IM B3, IM B35, IM B5 and derived types of construction according to DIN EN 60034-7: 1996

When mounting motors with vertical shaft position, there is to be prevented the ingress of foreign bodies into the vent holes.

Design for potentially explosive atmospheres according to apparatus group II, category 2 acc. to DIN EN 50281-1-1 and -2
Fixing dimensions and coordination between output and dimensions according to DIN 42673 page 1 or DIN 42677 page 1
Ambient temperatures -40°C to +40°C

The design of the motors has been tested by the DMT (Deutsche Montan Technik), certified with the certificate
DMT 00 ATEX E 002 X for the sizes 132 to 280
DMT 00 ATEX E 012 X for the sizes 56 to 132 T
and approved in the respective test report.

Design for zone 22

Series K21R / K11R
Sizes 56 - 355
Degrees of protection IP 55 according to DIN VDE 0530-5: 1988
Type of cooling IC 411 according to DIN EN 60034-6: 1996
Types of construction IM B3, IM B35, IM B5 and derived types of construction according to DIN EN 60034-7: 1996

When mounting motors with vertical shaft position, there is to be prevented the ingress of foreign bodies into the vent holes.

Design for potentially explosive atmospheres according to apparatus group II, category 3 acc. to E DIN EN 50281-1-1 and -2
Fixing dimensions and coordination between output and dimensions according to DIN 42673 page 1 or DIN 42677 page 1
Ambient temperatures -40°C to +40°C

The design of the motors has been certified with manufacturer's declaration of incorporation.

EC certificates of conformity and EC certificates of prototype test

Standards and specifications

The motors correspond to the appropriate standards, in particular to the following::

Title	DIN/VDE	IEC
General regulations for electrical rotating machines	DIN EN 60034-1/02.99	IEC 34-1 IEC 85
Fixing dimensions and coordination between output and dimensions at IM B3	DIN 42673	(IEC 72)
Fixing dimensions and coordination between output and dimensions at IM B5, IM B35 and IM B14	DIN 42677	(IEC 72)
Rotating electrical machines, terminal markings and direction of rotation	DIN VDE 0530 part 8	IEC 34-8
Rotating electrical machines, symbols for types of construction and mounting	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	DIN VDE 0530 part 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 part 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 cps	DIN EN 60034-12	IEC 34-12
IEC-standard voltages	DIN IEC 38	IEC 38
For EEx-motors are valid furthermore		
General regulations	DIN EN 50014/VDE 0170/0171 T.1	IEC 79-0
Increased safety „e“	DIN EN 50019/VDE 0170/0171 T.6	IEC 79-7
Flameproof enclosure „d“	DIN EN 50018 / VDE 0170/0171 T.5	-
Electrical apparatus for being used in areas with potentially inflammable dusts	DIN EN 50281-1-1	-

Furthermore, VEM motors comply with various foreign regulations which have been adapted to the IEC-publ. 34-1 and they are available according to the regulations of the Classification Authorities

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

For these standards and specifications are valid the following admissible limits of temperature rise:

Specifications	Coolant temperature	Admissible limit of temperature rise in K (measuring acc. to resistance method)			
		Insulation class			
	°C	A	E	B	F
DIN VDE 60034-1/02.99	40	60	75	80	105
IEC 34-1	40	60	75	80	105
Switzerland SEV	40	60	75	80	105
Germanischer Lloyd	45	55	70	75	95
American Bureau of Shipping	50	55	65	75	95
Bureau Veritas	50	50	65	70	90
Det Norske Veritas	45	50	65	70	90 ¹⁾
Lloyd's Register	45	50	65	70	90
Russ. Register	40/45	60	75	85	110

¹⁾ only with special approval

Tolerances

Following tolerances are admitted according to DIN EN 60034-1/02.99. These tolerances are permissible for the values assured for three-phase asynchronous motors, taking the necessary manufacturing tolerances and material variations of the used raw materials into account. The standard contains the following notes to that:

1. A guarantee for all or any of the values shown in the table is not mandatory. In tenders, the guaranteed values for which permissible deviations should apply must be expressly specified. The permissible variations must correspond to those stated in the table.
2. There is pointed to the distinctions concerning the definition „Guarantee“. In some countries, distinction is drawn between guaranteed values and typical or declared values.
3. If the permissible deviation applies only in one direction, then the value in other direction is not limited.

Tolerances of the design values

Efficiency (with indirect calculation)	-0,15 (1- η) up to $P_N \leq 50$ kW -0,1 (1- η) up to $P_N > 50$ kW
Power faktor	$\frac{1-\cos\varphi}{6}$ at least 0,02 at most 0,07
Slip (at rated-load operating temperature)	± 20 % up to $P_N \geq 1$ kW ± 30 % up to $P_N < 1$ kW
Starting current (in the planned starting circuit)	+ 20 % without limiting 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 intensity (measurement area sound pressure level)	+ 3 dB (A)

Tolerances of the fixing dimensions

Dimensional short sign according to DIN	Meaning of the dimension	Fit or tolerance
a	Spacing of housing foot fixing holes in axial direction	± 1 mm
b	Spacing of housing foot fixing holes across the axial direction	± 1 mm
e1	Pitch circle diameter of the attachment flange	$\pm 0,8$ mm
a1	Diameter or width across corner of the flange	+ 1 %
g	Largest width of the motor	+ 2 %
f	(without terminal box)	
k	Overall length of the motor	+ 1 %
k1		
p	Overall height (lower edge foot, housing or flange up to highest point of the motor)	+ 2 %
s	Diameter of the fixing holes of the foot or of the flange	+ 3 %
s1		
w1	Centre of the first fixing hole up to shaft end shoulder	± 3 mm
w2		
b1	Diameter of the centering shoulder of the attachment flange	up to 230 j6 from 250 h6
d	Diameter of the shaft end	up to $\varnothing 48$ k6 from $\varnothing 55$ m6
d1		
h	Shaft height (lower edge foot up to centre of shaft end)	up to 250-0,5 higher than 250-1
u	Width of the key	h9
u1		
t	Lower edge of shaft end up to upper edge of key	+ 0,2 mm
t1		
	Motor weight	- 5 bis + 10 %