ELECTRIC DRIVES
FOR EVERY DEMAND

Low voltage electrical machines

IEC motors with squirrel-cage rotor
for mains and converter-fed operation

IEC motors with slip-ring rotor

Branch-specific versions

Asynchronous generators

Permanent-magnet synchronous motors

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Main catalogue 2017

ELECTRIC DRIVES

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Steel and rolling mills

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ELECTRIC DRIVES

FOR EVERY DEMAND

There's a saying that less is more. But that is certainly not true in our case. On the contrary. Even the briefest glance into the VEM Catalogue 2017 shows that the product portfolio of the VEM Group has never been broader than it is today. And that is naturally reflected in the impressive scope of the catalogue in front of you.

We have structured and modularised the whole VEM product range, and have in this way realised the scalability and adaptability necessary to handle a full spectrum of present and future applications. That refers not only to our drive solutions for outputs ranging from 0.06 kW to 42 MW, but also to variable speed electric drive systems with high energy efficiency ratings, as well as diverse special motors and machines. The expansion of our product range is guided above all by the wishes expressed by customers, and we do everything possible to respond in advance to developments which are only just becoming apparent on the horizon.

How do we manage that? There are several explanations. Firstly, we accept no compromises regarding the quality of our work. Our production locations are at the same characterised by a high vertical range of manufacture, which permits us to react to even unusual customer requests. Close partnerships and valuable exchanges are also cultivated with scientific institutions, colleges and universities.

And last but not least: We possess more than 130 years of experience in electrical engineering. Around 30 million electric machines bearing the VEM badge are currently in use all over the world. They are found aboard ships, in trains and trams, and in chemical plants and rolling mills. VEM generators produce electricity in hydropower plants and wind farms.

The essential message we would like to convey: We are firmly committed to innovation, and already for that reason open to all ideas and suggestions from our customers. You are free to view this catalogue also as orientation for what the future holds in store. We definitely look forward to discussing current and coming developments with you.

Low voltage electrical machines
Main catalogue 2017

(invalid: Main catalogue 01-2012)

Contents

Low voltage electrical machines

1

Contents

Introduction

Electric machines from VEM are appreciated by millions of users worldwide, and the name VEM is respected as a seal of quality. Large and special machines, as well as standard motors and special drives, are operating reliably in all branches of industry. Plants of all kinds are equipped with motors, generators and drive solutions for the full range of voltages. These products have been demonstrating their strengths for decades, even when exposed to some of the most extreme operating conditions – whether the dust and heat of a rolling mill, explosive atmospheres in the chemical industry, or damp, salt-laden air on the deck of a ship. VEM products comply with all applicable standards and regulations.

Our quality management system is certified and monitored in accordance with ISO 9001:2008 by DNV GL Business Assurance, Essen, as well as by IBExU Institut für Sicherheitstechnik GmbH, *Notified Body no. 0637*, as per Article 10(1) of Directive 94/9/EC (new: Directive 2014/34/EU).

The expertise accumulated by our calculation and design departments enables us to tailor our machines to the individual needs of the user. Our designers also work closely with partners from science and research. This cooperation yields products which represent the latest state of the art on the market and thus define the yardstick for coming product generations. At the same time, our companies look back over more than a hundred years of tradition and experience in the manufacturing of electric machines. We supplied hydro-power generators for the first pumped-storage power plants in Germany, for example, and also developed the world‘s first standard motor series.

From standard motors to special drives – in use the world over

When you choose our quality products, you can be sure that all challenging aspects such as energy savings and environmentally aware manufacturing have been taken into account. In other words, we supply cost-optimised drive solutions for all individual industrial applications. Our flexibility, the availability of our products and our high delivery reliability support you in your worldwide investment projects.

Fast and flexible – more than just standard products

With a broad spectrum of low-voltage electric machines, VEM offers versatile, efficient and modular products and system solutions for every branch. In project business, in particular, we supply machines meeting the highest engineering standards to users all over the world.

Our products are characterised by extraordinary reliability, a long service life, effectiveness and environment-friendly operation based on the highest levels of motor efficiency. Extensive modification options promote the universal applicability of VEM drives and permit use in an ever wider range of situations, whether in metallurgy, the chemical industry or conveying and transportation systems. Modern manufacturing and comprehensive know-how guarantee fast and reliable deliveries of high-quality drives. Our product range embraces standard and special motors, modern three-phase drives with integrated frequency converter, roller table motors, brake motors, three-phase motors for marine applications, explosion-protected motors, fire gas motors, energy-saving motors, built-in motors, permanent magnet synchronous motors and generators for outputs up to 710 kW.

Industry-wide drive solutions made by VEM – innovative performance for your worldwide installations

Whether as fan or conveyor drives, variable-speed drives for pumps, drive solutions in power generation or compressor drives with outputs of several megawatts, our drives offer convincing product and service quality. Under the trademark VEM, we supply German brand-name products which have earned themselves a considerable share of the worldwide market.

Electric drives are today used throughout industry in the most diverse variants. With their specific properties, they determine the efficiency of countless production processes. The VEM range of three-phase asynchronous motors for low voltages satisfies all customer demands relating to application versatility, improved operating data, environmental compatibility and maximum operating reliability. To this end, VEM motors promise:

- high motor efficiency as the basis for energy-efficient performance
- versions with efficiency classifications IE2, IE3 and IE4 in accordance with IEC/EN 60034-30-1
- universal applications and reduced stock levels thanks to IP 55 protection as standard (higher degree of protection up to IP 66 upon request)
- options for terminal box arrangements on the left, top or right
- enhanced service life, reliability and thermal overload capacity to thermal class 155 (F) with thermal reserves as standard (thermal class 180 (H) available as a special version)
- environment-friendly operation based on a low-noise ventilation system
- compliance with East European standards
- free choice between a classic IEC/DIN series and a progressive series based on the mounting dimensions and motor sizes of IEC 60072 (motors without IE classification only)
- facility to incorporate components such as encoders, tacho generators, brakes, speed monitors or forced ventilation units to solve the customer‘s individual control tasks

Committed to the environment

Protection and preservation of the environment for the present and all future generations – VEM is fully committed to this responsibility. Together with plant manufacturers, we have been working for many years to promote the use of energy-optimised motors and drive systems, and to maximise energy savings.

Already through its endorsement of the Voluntary Agreement signed between CEMEP and the European Union, as well as support for the EU "Motor Challenge Programme", VEM documented its clear position with regard to the energy efficiency of its products. This process has been continued purposefully with implementation of Council Directive 2009/125/EC "establishing a framework for the setting of ecodesign requirements for energy-related products", and is clearly exemplified in conversion of the product range to electric motors with efficiency classifications IE2, IE3 and IE4.

Energy-saving motors from VEM fit into practically every drive concept and are characterised by their significantly reduced power losses compared to previous standard motors. For many types of the new IE3 series W41R, it has also been possible to pack this increased efficiency into a much smaller housing by using die-cast copper rotors.

Assuming at least 8 hours of operation, energy-saving motors of the efficiency classes IE2, IE3 and IE4 recoup their investment in less than a year. In addition to the specifications contained in standards regarding energy parameters, material-related issues are similarly taken into account, meaning that all critical and proscribed substances (REACH regulations) have been banished from further developments of our motor series. It is a fundamental goal to minimise environmental impacts and to spare natural resources in all phases of the product life cycle.

Sustainability is more than just a buzzword for VEM – it is an inherent component of our corporate philosophy. To achieve more transparent accountability for the environmental policies at the individual locations, the VEM companies are certified to DIN EN ISO 14001 and ISO 50001.

Partners for our worldwide customers

Wherever our customers need electric machines, we are at hand as a partner and offer every necessary support at all phases of a project. It is not important whether you are doing business in Europe, the Middle East, Asia or America. As the VEM market share increases also outside Germany, we are expanding our sales network with a combination of own subsidiary companies and strategic alliances. Already today, our customers can address their questions to competent and experienced local partners all over the world. Alongside VEM subsidiaries in Finland, Austria, Singapore and Russia, we have established a dense network of sales and service contacts with agents and representatives in more than 40 countries.

Information on applicable standards and regulations

IE-Code

Over the past few years, the worldwide developments relating to energy-saving motors have produced a multitude of country-specific regulations, laws and standards, which makes it difficult to properly compare individual products. The new IEC/EN standard 60034-30 is thus intended to establish a global common basis. In Europe, the standard supersedes the previous "Voluntary Agreement of CEMEP". Its scope has at the same time been extended to cover an output range from 0.75 kW to 375 kW, not only for 2- and 4-pole motors, but now also to 6-pole versions.
When IEC/EN 60034-30-1 came into force, it broadened the scope of applicability yet again. It currently applies across an output range from 0.12 kW to 1000 kW, and now includes 8-pole motors in the classification. Following the convention used to designate degree of protection (IP = International Protection), the efficiency classes are indicated by the letters IE, standing for International Efficiency:

IE1 Standard Efficiency
IE2 High Efficiency
IE3 Premium Efficiency
IE4 Super Premium Efficiency

Efficiency determination

Parallel to the introduction of the new efficiency classes, the standard describing methods for the determination of efficiency has also been amended. In accordance with IEC/EN 60034-2-1, the additional losses are no longer simply assumed to be 0.5 % of the power input, but instead determined in the manner of IEEE 112. The losses determined in this way vary with the motor power and lie between 3.5 % (low power) and 0.5 % of the power input. Consequently, the nominal efficiency may be reduced, even though no actual changes have been made to the motors themselves. The new limit values have been adapted to this method. IEC/EN 60034-2-1 replaced the previously used IEC/EN 60034-2 with effect from November 2010. As a formal conversion of test results to the new measuring method is not possible, the new stipulations are being introduced in stages. IE-classified motors are always assessed according to IEC/EN 60034-2-1. In the case of motors without classification, the efficiency specifications are in part still based on IEC/EN 60034-2 (indicated accordingly in the present catalogue).

Notes on the application of IEC/EN 60034-30-1 and Commission Regulations (EC) No. 640/2009 and (EU) No. 4/20142014

With Commission Regulation (EC) No. 640/2009 of 22nd July 2009, which serves to implement European Directive 2005/32/EC, minimum efficiency classes (Minimum Efficiency Performance Standard, MEPS) are now stipulated on the basis of EN 60034-30:2009 and are to be gradually introduced in the market for certain types of electric motor.

Which motors are covered by VO (EG) 640/2009 + VO (EG) 4/2014?

Single-speed three-phase asynchronous motors with squirrel-cage rotor for 50 Hz and/or 60 Hz which are designed
- with a rated voltage U_N up to 1000 V;
- with a rated output P_N between 0.75 kW and 375 kW;
- with 2, 4 or 6 poles;
- for duty cycles S1 (continuous duty) or S3 (intermittent periodic duty) with a cyclic duration factor of 80 % or more;
- for direct starting on the mains;
- for rated operating conditions in accordance with EN 60034-1, section 6.

Which motors are excluded from IE classification by EN 60034-30-1?

- Motors which are designed specifically for converter-fed operation in accordance with IEC 60034-25;
- Motors which are fully integrated into a machine (e. g. pumps, fans and compressors) and cannot be tested separately.

Which motors are covered by IEC/EN 60034-30-1?

Single-speed three-phase asynchronous motors with squirrel-cage rotor for 50 Hz and/or 60 Hz which are designed
- with a rated output P_N between **0.12 kW and 1000 kW;**
- with a rated voltage U_N between 50 V and 1 kV;
- with 2, 4, 6 or **8** poles
- for continuous operation at rated output, in which case the temperature increase remains within the range of the specified temperature class;
- for installation at altitudes up to 4000 metres above sea level.

Motors with flanges, feet and/or shaft ends whose mechanical dimensions deviate from those specified in IEC 60072-1 are covered by the present standard. The following motors are excluded:
- Motors with 10 or more poles, as well as pole-switching motors;
- Motors with mechanical commutators (e. g. DC motors);
- Motors which are fully integrated into a machine (e. g. pumps, fans and compressors) and cannot be tested separately (IC 418)
- Motors with integrated frequency converter (compact drives) where the motor cannot be tested separately from the converter;
- Brake motors where the brake is an integral component of the internal motor construction and cannot be removed or operated on a separate power supply during efficiency testing;
- Motors which are operated while wholly and permanently immersed in a liquid;
- Fire gas motors from a temperature class >400 °C.

Which motors are not covered by Commission Regulations (EC) No. 640/2009 and (EU) No. 4/2014?

a) Motors which are designed to be operated wholly immersed in a liquid;
b) Motors which are fully integrated into a product (e. g. a gearbox, pump, fan or compressor) such that the energy efficiency cannot be determined separately from the product;
c) Motors which are designed specifically for operation under the following conditions:
   i) Altitude more than 4000 metres above sea level;
   ii) Ambient temperatures above 60 °C;
   iii) Maximum operating temperatures above 400 °C;
   iv) Ambient temperatures below –30 °C (any motor) or below 0 °C (water-cooled motor);
   v) Coolant temperatures below 0 °C or above 32 °C at the inlet to a product;
   vi) Potentially explosive atmospheres in the sense of Directive 2014/34/EU
d) Brake motors

Which deadlines apply for the introduction of minimum efficiency classes?

Stage 1: Minimum efficiency class IE2 since 16th June 2011
Stage 2: Tightening to IE3 [Premium Efficiency] with effect from 1st January 2015 for the output range 7.5 kW to 375 kW. Optional possibility: “IE2 + converter”.
Stage 3: Extension of output range to between 0.75 kW and 375 kW with effect from 1st January 2017. The optional possibility “IE2 + converter” remains applicable.

The manufacturer guarantees to the customer by way of CE marking that the required nominal efficiency is attained and that the rated efficiency specified on the rating plate is observed.
The permissible tolerances specified in IEC/EN 60034-1 continue to apply.

New requirements for documentation (taken from Reg. (EC) No. 640/2009 + (EU) No. 4/2014)

From 16th June 2011, the information set out in points 1 to 12 is to be displayed visibly:

a) in the technical documentation of motors;
b) in the technical documentation of products into which motors are incorporated;
c) on freely accessible websites of the manufacturers of motors;
d) on freely accessible websites of the manufacturers of products into which motors are incorporated.

In the technical documentation, the information must be provided in the order as presented in points 1 to 12. It is not imperative to use the exact wording used in the list. The information may also be presented using graphs, diagrams and symbols.

1. Nominal efficiency (η) at 100 %, 75 % and 50 % of the rated load and voltage (U_N);
2. Efficiency level: “IE2” or “IE3”;
3. Year of manufacture;
4. Manufacturer‘s name or trademark, commercial registration number and place of business;
5. Product model number;
6. Number of poles of the motor;
7. Rated power output(s) or range of rated power output [kW];
8. Rated input frequency(-ies) of the motor (Hz);
9. Rated voltage(s) or range of rated voltage [V];
10. Rated speed(s) or range of rated speed [rpm];
11. Information relevant for disassembly, recycling or disposal at the end-of-life of the product
12. Information on the range of operating conditions for which the motor is specifically designed:
    (i) altitudes above sea level
    (ii) ambient air temperatures, also for motors with air cooling
    (iii) water coolant temperature at the inlet to the product
    (iv) maximum operating temperature
    (v) potentially explosive atmospheres

Since 16th June 2011, it is no longer permissible to bring non-classified or IE1 standard motors covered by Commission Regulation (EC) No. 640/2009 onto the market in the EU. The tightened stipulations of Commission Regulation (EU) No. 4/2014 apply since 27th July 2014.

Motors for the North American market

For the US and Canadian markets (insofar as motors according to IEC standards are accepted), approval has been obtained for the motor series from UL (Underwriters' Laboratories Inc.), both for the electrical insulation system and for the motor construction. It is possible to supply motors in accordance with the electrical regulations of NEMA MG1 "Motors and Generators".
The previously applicable Energy Independence and Security Act (EISA) was superseded by the Energy Conservation Program: Energy Conservation Standards for Commercial and Industrial Electric Motors on 1st June 2016. The new legislation raises the required minimum efficiency to the next higher level for numerous motor types, and its scope of applicability has also been extended to include certain motor types which were not yet covered by the EISA regulations. The responsible legislative authority, the DOE, assesses compliance with the regulations and grants approvals for imports to the US market (CC number) from the point of view of energy efficiency. In this sense, the DOE monitors observance of the minimum requirements by the market. Energy-saving motors from VEM have been granted approval under CC number CC301B for the output range from 5 to 200 hp.

Motor type	Characteristic		Required efficiency class
General purpose electric motor, subtype I	1 to 200 hp standard motor	2, 4, 6 or 8 poles, S1, IM B3, IM B35, IM B34, NEMA Design A or B	NEMA Premium Efficiency
General purpose electric motor, subtype II	U series (old housing 1952–1964)		NEMA Premium Efficiency
	Motor with Design C starting characteristics		
	Close-coupled pump motor		
	Motor without feet	IM B5, IM B10, IM B14	
	Motor with vertical shaft and normal thrust	IM V…	
	8-pole motor		
	Motor ≤ 600 V, but not 230 or 460 V	500 V (50 Hz) 275 V Δ/480 V Y (60 Hz) 480 V (60 Hz) 600 V (60 Hz) 440 V (60 Hz)	
General purpose electric motor	Motor with Design B starting characteristics > 200 to 500 hp	2, 4, 6 or 8 poles, S1, IM B3, IM B35, IM B34, NEMA Design A or B 60 Hz, 230 and/or 460 V	NEMA Premium Efficiency
General purpose electric motor	Motor with Design D starting characteristics		No specification
	Converter-fed motor		
	Intermittent/periodic duty	S3, S4, S5, S6, S7, S8, S9	
	Submersible motor		
	Pole-switching motor		
Size 56 according to NEMA, enclosed version			NEMA Premium Efficiency
Customer-specific version			NEMA Premium Efficiency
Motors for fire extinguishing pumps	1 to 200 hp		NEMA Premium Efficiency

Compliance with foreign regulations

North America
It must always be checked whether motors are to be used in the USA or Canada.

UL approval (UL Files E216022, E216143)
The approval applies for the series **A..., B..., K..., S..., W..., X..., Y...** in sizes 56 to 400.
In addition, the motors are designed electrically to comply with NEMA MG1-12.
Motors are marked accordingly on the rating plate
Additional specifications: Design letter and code letter
The UL certification is thus valid for both the US and Canadian markets.

CSA approval
Motors of the series W41R in sizes between 112 and 315 are approved according to the regulations of the “Canadian Standard Association” (CSA), File No. 184534 – 70014954.
The depicted logo is incorporated into the rating plate.
Built-on and built-in components must also be CSA-listed or else manufactured in compliance with the approval. CSA certification is thus valid for both the US and Canadian markets.

Motors of the series W41R also meet the requirements for “Premium efficiency” in accordance with EISA and CSA C390-10. The series is CSA-certified under File No. 184535 – 70014956.

Energy Verified

Neither UL, cULus nor CSA approval has been granted for explosion-protected motors.
Additional regulations apply to motors with legally stipulated minimum efficiency ratings.

China, CCC – China Compulsory Certification
China Compulsory Certification (CCC) was introduced as a mandatory certification and identification system in China in 2002. Under this system, small-power motors exported to China are subject to certification up to a certain rated output.

2-pole, synchronous speed 3000 rpm:	≤ 2.2 kW
4-pole, synchronous speed 1500 rpm:	≤ 1.1 kW
6-pole, synchronous speed 1000 rpm:	≤ 0.75 kW
8-pole, synchronous speed 750 rpm:	≤ 0.55 kW

Since 1st August 2003, the Chinese customs authority has treated CCC as a valid guideline for corresponding motor imports into China.

Customs Union – Russia, Belarus, Kazakhstan
In 2010, it was decided to gradually harmonise the system of certification across the Customs Union (Belarus, Kazakhstan, Russia) and to replace the previous GOST system with so-called Technical Regulations (TR/CU) which are valid for all member states of the Customs Union.

Approved products are identified by way of the new EAC mark of conformity.
It is an imperative prerequisite for a foreign manufacturer to nominate an authorised representative (agency, branch office, sales office, importer) within the Customs Union to assume product liability. The manufacturer must then have a registered TR/CU declaration created and signed by this representative. This declaration is registered with the GOST certification office and must also be presented to customs in a simple copy.

For explosion-protected motors, VEM possesses EAC Ex certificate no. ТС/RU C-DE.ГБ08.В.00859.
This covers the explosion protection types:
Ex nA (series KPR, KPER, (IE.-)K1.R, W.1R, (IE.-)W41R and (IE.-)W42R)
Ex e (series (IE.-)K1.R, (IE.-)K2.Q and W.1R)
Ex tD (series KPR, KPER, (IE.-)K1.R and W.1R)
Ex d/de (series K8.R, B82 and K8UR)

GAZPROM
VEM possesses approval from GAZPROM/Russia for the motor series A, B, C, G, K, S, W and Y. The number of the approval certificate is ГО00.DE.1339.H00003.

Spare motors in EFF2, EFF1 and IE1
Deliveries of motors in this design version are definitively no longer possible. This applies also to the Eff1 design version. Use of the EFF mark was only permitted until 15th June 2011. Since this time, the manufacturing of IE1 motors has only been permissible under the exception clauses specified in Commission Regulation (EC) No. 640/2009. Spare parts can still be supplied without restriction.

Optimised IE2 series WE2R
IE2 motors are available for the whole output range from 0.75 to 355 kW. In the meantime, individual sizes have been optimised and offered parallel to the W.1R series under the type designation WE2R. These types use a new, longer housing. The motors of the WE2R series have replaced the corresponding W.1R types since 2013.

Technical explanations

Standards and regulations

The motors comply with all relevant standards and regulations, in particular with the following:

Title	International	Europe
	IEC	**EN**
Rotating electrical machines. Rating and performance	IEC 60034-1	EN 60034-1
Methods for determining losses and efficiency of rotating electrical machinery from tests	IEC 60034-2-1	EN 60034-2-1
Efficiency classes of single-speed, three-phase, cage-induction motors	IEC 60034-30-1	EN 60034-30-1
Degree of protection provided by the integral design of rotating electrical machines (IP code) – Classification	IEC 60034-5	EN 60034-5
Methods of cooling (IC code)	IEC 60034-6	EN 60034-6
Classification of types of construction, mounting arrangements and terminal box position (IM code)	IEC 60034-7	EN 60034-7
Terminal markings and direction of rotation	IEC 60034-8	EN 60034-8
Noise limits	IEC 60034-9	EN 60034-9
Starting performance of single-speed three-phase cage induction motors	IEC 60034-12	EN 60034-12
Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurement, evaluation and limits of vibration severity	IEC 60034-14	EN 60034-14
Mechanical vibration. Balance quality requirements for rotors in a constant (rigid) state	ISO 1940	-
IEC standard voltages	IEC 60038	-
Electrical insulation – Thermal evaluation and designation	IEC 60085	-
General purpose three-phase induction motors having standard dimensions and outputs	IEC 60072-1	EN 50347
Explosive atmospheres Part 0: Equipment – General requirements	IEC 60079-0	EN 60079-0
Explosive atmospheres Part 1: Equipment protection by flameproof enclosures “d“	IEC 60079-1	EN 60079-1
Explosive atmospheres Part 7: Equipment protection by increased safety “e“ (new „eb“)	IEC 60079-7	EN 60079-7
Explosive atmospheres Part 15: Equipment protection by type of protection “n” (new: Increased safety „ec“, part 7)	IEC 60079-15	EN 60079-15 (EN 60079-7)
Explosive atmospheres Part 31: Equipment dust ignition protection by enclosure “t”	IEC 60079-31	EN 60079-31
Explosive atmospheres Part 10-2: Classification of areas – Explosive dust atmospheres	IEC 60079-10-2	EN 60079-10-2

VEM motors comply furthermore with various foreign regulations which are either based on IEC 60034-1 or else transpose the latter's stipulations as European standard EN 60034-1.

The following temperature-rise limits apply in conjunction with the aforementioned standards and regulations:

Regulation	Cooling air temperature	Permissible temperature-rise limit in K (measured by resistance method)				
Thermal class acc. to EN 62114	°C	105 [A]	120 [E]	130 [B]	155 [F]	180 [H]
EN 60034-1	40	60	75	80	105	125
IEC 60034-1	40	60	75	80	105	125
Great Britain	40	60	75	80	105	125
Italy	40	60	70	80	105	125
Sweden	40	60	70	80	105	125
Norway	40	60	-	80	105	125
Belgium	40	60	75	80	105	125
France	40	60	75	80	105	125
Switzerland	40	60	75	80	105	125

Type designation

The type designation comprises 8 basic parts + a code for special versions, namely
- the **energy efficiency class,**
- the **motor version,**
- the **series code,**
- the **type of cooling,**
- the **size/shaft height,**
- the **foot length** and a **supplementary code for output definition,**
- the **number of poles,**
- the code for the **type of protection in case of explosion-protected motors** and
- the **special version code,**

which are strung together to form a complete motor designation. It is not imperative for each of the 8 elements to be present. In the following, the individual elements are explained together with their possible combinations. **Deviations from the type designation are only permissible for certified series, for example CSA-certified motors are only available as K11R (see Point 10 – Series).**

IE2	-	W	E	1	R		160	M	X	2		Ex e IIC T3	IL	…	HW
1		2	3		4		5	6		7		8	9	…	10

1. Energy efficiency class

	Designation	Standard
(none)	Not classified	-
IE1	Standard Efficiency	IEC/EN 60034-30-1
IE2	High Efficiency	IEC/EN 60034-30-1
IE3	Premium Efficiency	IEC/EN 60034-30-1
IE4	Super Premium Efficiency	IEC/EN 60034-30-1

2. Motor version

	Designation
A	Roller table motor
B	Brake motor (squirrel-cage rotor)
G	Asynchronous generator
K	Squirrel-cage rotor
P	Permanent-magnet synchronous motor
S	Slip-ring rotor
W	Energy-saving motor
Y	Squirrel-cage rotor, housing rotated, terminal box on N end
DS	Three-phase transnorm motor as welded steel construction

3. Series

	Designation
	Not specified in case of three-phase transnorm motors as welded steel construction
10	Design generation 1, progressive IEC series
11	Design generation 1, IEC/DIN series
12	Design generation 1, IEC/DIN series, deviating basic type assignment
20	Design generation 2, progressive IEC series
21	Design generation 2, IEC/DIN series
22	Design generation 2, transnorm series
23	Design generation 2, transnorm series, increased output
25	Design generation 2, progressive series, DIN shaft height/output assignments
41	Energy-saving series with efficiency class IE3
42	Energy-saving series with efficiency class IE3, transnorm motors with internal cooling
46	Energy-saving series with efficiency class IE3, altered basic type 60 Hz
5	High-voltage version, 2.2 – 6.6 kV
52	High-voltage version, transnorm motors
E1	Energy-saving series with efficiency class IE2, design generation 1
E2	Energy-saving series with efficiency class IE2, design generation 2 (all sizes/numbers of poles)
E6	Energy-saving series with efficiency class IE2, altered basic type 60 Hz
U0	Design generation 2, progr. IEC series, converter-fed operation, curve A, DIN VDE 0530-25:2009
U1	Design generation 2, IEC/DIN series, converter-fed operation, curve A, DIN VDE 0530-25:2009
U2	Design generation 2, transnorm series, converter-fed operation, curve A, DIN VDE 0530-25:2009
V0	Design generation 2, progr. IEC series, converter-fed operation, curve B, DIN VDE 0530-25:2009
V1	Design generation 2, IEC/DIN series, converter-fed operation, curve B, DIN VDE 0530-25:2009
V2	Design generation 2, transnorm series, converter-fed operation, curve B, DIN VDE 0530-25:2009
V4	Design generation 2, DIN series, converter-fed operation, curve B, DIN VDE 0530-25:2009
P	In combination with 2nd code element S, motors with slip-ring rotor
PE	In combination with 2nd code element S for slip-ring rotor, DIN motors
RB	In combination with 2nd code element A: Roller table motor for mains operation, type of cooling IC 410, 4th code element not applicable
RC	Ring-ribbed housing In combination with 2nd code element A: Roller table motor for converter-fed operation, type of cooling IC 410, 4th code element not applicable
RG	Ring-ribbed housing In combination with 2nd code element A: Geared roller motor for converter-fed operation, type of cooling IC 410

4. Type of cooling
4.1 Standard series

	Designation	Type of cooling
A	Open-circuit air cooling	IC 01, IC 06
B	Water cooling	IC 71W, IC 31W
WM	Water jacket cooling for three-phase transnorm motors as welded steel construction, series DS..	IC 71W, IC 31W
F, f	Rib cooling with built-on forced-ventilation fan	IC 416
O, o	Rib cooling without own fan	IC 410
R	Rib cooling with own fan	IC 411
U	Closed-circuit air cooling	IC 511

4.2 Slip-ring rotor, crane and steelworks versions

	Designation	Type of cooling
E	Rib cooling with built-on forced-ventilation fan	IC 416
H	Rib cooling with own fan	IC 411
T	Rib cooling without own fan	IC 410

5. Size

56, 53, 71, 80, 90, 100, 112, 132, 160, 180, 200, 225, 250, 280, 315, 355, 400
ARB: 22 (132), 33 (125), 54 (170) und 65 (200)
Figures in brackets: Shaft height in mm

6. Foot length

Foot length	Designation
S	short
M	medium
L	long

Supplementary code for output definition

Supplementary code	Designation
X	Higher output in case of two outputs/foot length
Y	Reduced output*)
Z	Higher output in case of three outputs/foot length

*) increased output for size 315

7. Number of poles

2p=	Synchronous speed n (at 50 Hz) [rpm]
2	3000
4	1500
6	1000
8	750
10	600
12	500
16	375
20	300
24	250

Hyphen as separator in case of pole-switching motors, descending number of poles

8. Codes for special design versions

8.1 Codes for type of protection for explosion-protected equipment (always specified immediately after the number of poles!)

Code	Type of protection
Ex e IIC T1/T2, T3 or T4	Increased safety “e”
Ex eb IIC T1/T2, T3 oder T4	Increased safety “eb“ acc. to EN 60079-7:2015
Ex nA IIC T1/T2, T3 or T4	Non sparking “n” to EN 60079-15:2010
Ex ec IIC T1/T2, T3 oder T4	Increased safety “ec“ acc. to EN 60079-7:2015
Ex II 2D	Protection by enclosure “tb”
Ex II 3D	Protection by enclosure “tc”
Ex eb IIC T. 2D	Increased safety “eb” or protection by enclosure “tb”
Ex eb IIC T. 3D	Increased safety “eb” or protection by enclosure “tc”
Ex ec IIC T. 2D	“ec” or protection by enclosure ”tb“
Ex ec IIC T. 3D	“ec” or protection by enclosure ”tc“
Ex d(e) IIC (B) T4, T5 or T6	Flameproof enclosure “d” or “de”

8.2 Efficiency class for certified design versions which exclude marking by way of code element 1

Marking in accordance with the table under Point 1 as a suffix

8.3 Fire gas class

VEM category	Class acc. to DIN EN 12101-3	Operating time/stress temperature in case of emergency
FV (formerly FV0)	$Ff_{200}(60)$	1 hour at 200 °C
FV1	F_{200}	2 hours at 200 °C
	$Ff_{250}(60)$	1 hour at 250 °C
FV2, FV2-1	F_{300}	1 hour at 300 °C
	Ff_{250}	2 hours at 250 °C
FV3, FV3-1	Ff_{300}	2 hours at 300 °C
FV4-2, FV4-4	F_{400}	2 hours at 400 °C
	$Ff_{400}(90)$	1,5 hours at 400 °C
	$Ff_{400}(60)$	1 hour at 400 °C
FV4-3	F_{400}	2 hours at 400 °C
FV5	F_{600}	1 hour at 600 °C

9. Codes for special versions

TWH	Thermal winding protection with NTC thermistor
TPM	Thermal winding protection with PTC thermistor
WE	Special shaft
….	….

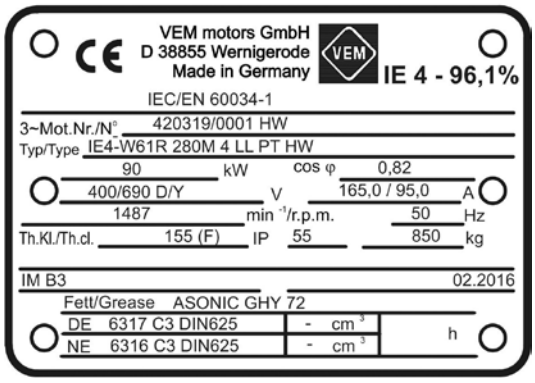
For further special versions, see overview of modifications

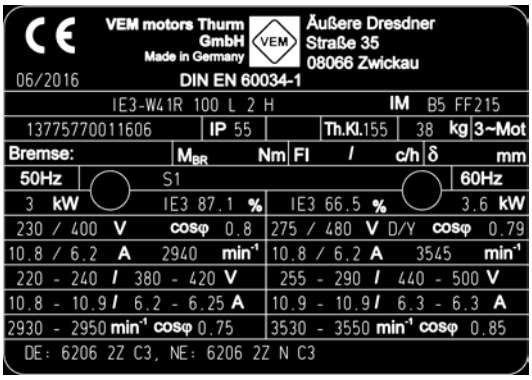
Rating plate

In the normal standard version, the motor rating plate displays information in the German and English languages. Other languages are possible, though an extra charge must be made for non-EU languages.

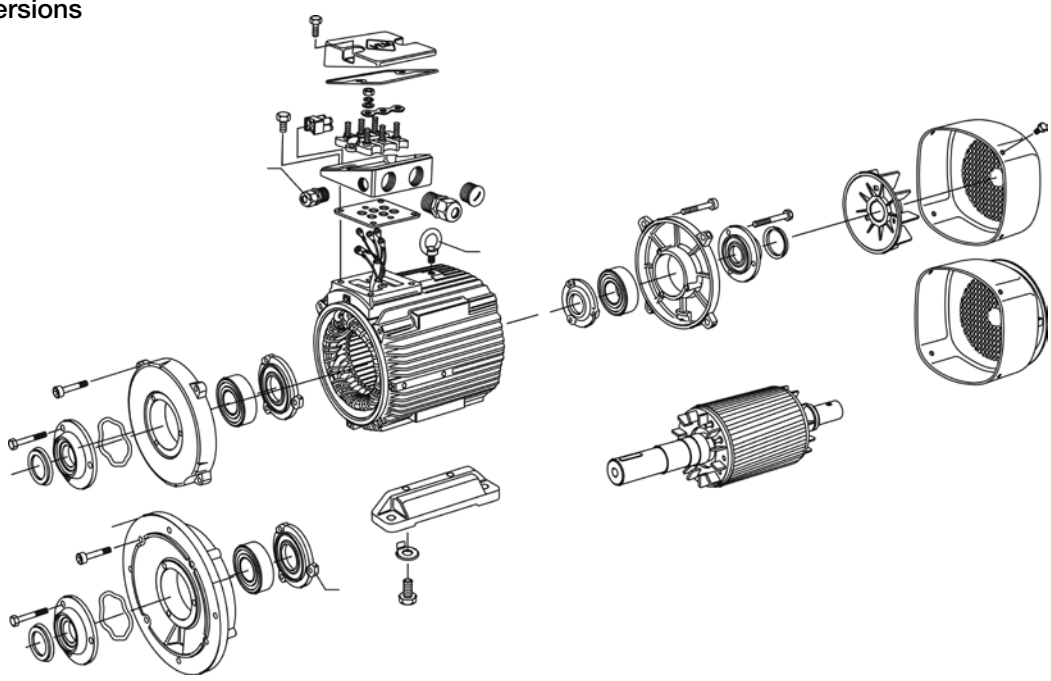
The rating plate displays the most important rating data, such as the type designation and motor number, output, rated voltage and frequency, rated current, type of construction, type of protection, power factor, speed, thermal class, IE code with efficiency rating, and explosion protection type.

The scope of information may vary according to motor type. In the case of motors with relubrication system, the relubrication interval and the grease amount per lubrication cycle are also specified either on the rating plate itself or on an additional plate. Rating plates are attached to the housing using grooved pins such that they are permanently secure. They can be made of aluminium or stainless steel (extra charge). Consultation is necessary if additional plates are required.





Design versions



Motors comprise the following main components:
- Stator housing with laminated core and winding
- End shields with bearings
- Die-cast rotor (aluminium or copper)
- Fan with fan cowl
- Terminal box

The motor space is defined by the housing, the two end shields, the outer bearing cover, the shaft seal and the terminal box gasket. Stator housings are always manufactured in grey cast iron, with radially or horizontally/vertically arranged cooling ribs. A flange surface with a corresponding opening to the housing inner is cast-on for mounting of the terminal box and terminal base. The flange surface is covered by the terminal box gasket. The terminal box can be arranged on the right, on the left or on the top.

In the case of heavy-duty roller table motors, ring-ribbed housings are used.

Shaft height	Series	Material for housing I end shields I feet	Foot mounting
63 to 132 T	KPER, K21R, W.2R	Grey cast iron	Bolted
100 LX	KPER, K21R, W.2R		Cast-on
132 to 280	K11R, K21R, W.1R, W.2R		Bolted
315	K11R, K21R, W.1R, W.2R, PE.R		Cast-on
355, 400	K22R, W22R, WE1R, WE2R, W41R, W42R		
56 to 100	KPR, K20R		Cast-on
112 to 250	K10R, K20R		Bolted
280 to 315	K10R, K20R		Cast-on
225 to 280	K21B, K23B WE1B, W21B, W4.R	Grey cast iron	Bolted
315 to 400		Sheet steel	Welded
132 to 200	ARB	Grey cast iron	Cast-on
112 to 400	ARC		Cast-on
355 to 630	DS, DSf, DSo, DSWM	Sheet steel	Welded
132 to 250 M	SPER, SPEH	Grey cast iron	Bolted
250 MX to 315	S11R, S11H		Cast-on
132 to 225	SPR, SPH		Bolted
250 to 280	S10R, S10H		Cast-on

Cooling and ventilation

The motors are fitted with radial fans made from plastic or cast aluminium alloy, which provide cooling independently of the running direction of the motor (IC 411 to IEC/EN 60034-6). For noise reasons, 2-pole motors with shaft height 355/400 can only be supplied with low-noise, direction-dependent fans. If requested by the customer, 2-pole motors with smaller shaft heights can also be fitted with a low-noise, direction-dependent fan. When installing the motors, a minimum clearance between the fan cowl and the wall (dimension BI) must be observed to ensure correct cooling. The fan cowl is always manufactured in sheet steel.

Degree of protection

Overview of possible degrees of protection in accordance with IEC/EN 60034-5, EN 60529:

Against penetration of foreign objects		Not protected	≥ 1,0 mm	Dust-proof	Dust-tight
Against contact with hazardous parts		Not protected	Wire	Wire	
	1st numeral →	0	4	5	6
Against harmful ingress of water	2nd numeral				
Not protected	0	IP 00			
Splashed water	4		IP 44	IP 54	
Water jets	5			IP 55	IP 65
Powerful water jets	6			IP 56	IP 66
Temporary immersion	7			IP 57S [1]	IP 67

[1] S … Standstill

The motors possess condensate drain holes in the end shields (by request only for shaft heights up to 132 T); these holes are closed with plastic plugs.

In case of motors with a shaft end pointing upwards, the user must take appropriate precautions to prevent the penetration of water along the shaft.

On flange motors of construction types IM V3 / IM V36 , a drain hole is provided as standard to prevent the collecting of liquid in the flange end. Where motors are to be used or stored outdoors, a corresponding roof or additional covers are recommended in order to avoid long-term exposure to direct sunlight, rain, snow and dust, and to eliminate the risk of the fan freezing up due to direct snowfall or icing. In such cases, it is recommended to consult the manufacturer for technical clarification.

The machines are suitable for use in tropical environments.
Guide value of 60 % relative humidity at
coolant temperature 40 °C
Ambient temperature: -20 °C to +40 °C
Installation altitude: ≤ 1000 metres above sea level

The use of non-rusting bolts and screws (option) is recommended if the motor is to be used outdoors or in a corrosive environment. Any deviating ambient conditions are specified on the motor rating plate.
The specifications on the rating plate shall then apply.

Vibration response and balancing

The permissible vibration severities for electric motors are specified in standard IEC/EN 60034-14. VEM motors already meet or remain below the limit values specified for vibration severity grade A (normal, without designation on the rating plate) in their basic versions. Vibration severity grade B (special code “SGB” in the type designation) can be supplied at extra charge.
IEC/EN 60034-14 recommends the following values:

Vibration severity grade	Shaft height H	56 ≤ H ≤ 132			132 ≤ H ≤ 280			280 > H		
	Machine installation	s_{eff} [µm]	v_{eff} [mms^{-1}]	a_{eff} [ms^2]	s_{eff} [µm]	v_{eff} [mms^{-1}]	a_{eff} [ms^2]	s_{eff} [µm]	v_{eff} [mms^{-1}]	a_{eff} [ms^2]
A	Free suspension	25	1,6	2,5	35	2,2	3,5	45	2,8	4,4
	Rigid mounting	21	1,3	2,0	29	1,8	2,8	37	2,3	3,6
B	Free suspension	11	0,7	1,1	18	1,1	1,7	29	1,8	2,8
	Rigid mounting	-	-	-	14	0,9	1,4	24	1,5	2,4

Grade A is applicable for machines with no special vibration requirements.
This grade is essentially equivalent to the old grade N in case of free suspension. For motors from size 250, the limit values are tightened from 3.5 mm/s to 2.8 mm/s.
This corresponds to the former limit value for R at speeds > 1800 rpm.

Grade B is applicable for machines with special vibration requirements.
This grade is essentially equivalent to the old grade S in case of free suspension.

The corner frequencies for vibration displacement/vibration velocity and vibration velocity/vibration acceleration are 10 Hz and 250 Hz, respectively. It must be noted that the measured values may deviate from the actual values by ±10 % due to the tolerances of the measuring devices.

With regard to the routine testing of machines with speeds between 600 and 3600 rpm, IEC/EN 60034-14 states that it is sufficient to measure the vibration velocity.

All rotors are balanced dynamically with a half-key in place. This balancing is documented on the rating plate by way of the letter “H” after the motor number. Upon request, it is possible to perform balancing with a full key. This is subsequently indicated by the letter “F” after the motor number.

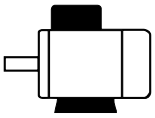
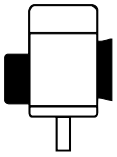
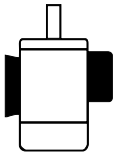
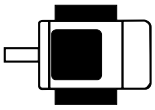
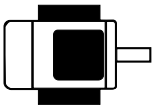
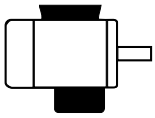
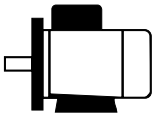
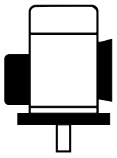
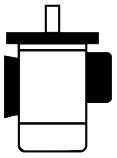
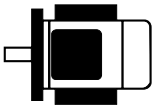
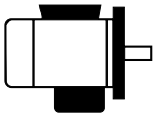
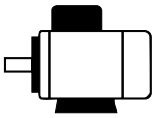
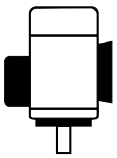
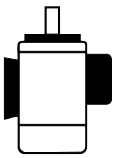
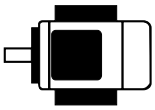
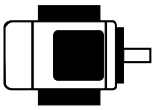
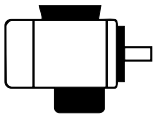
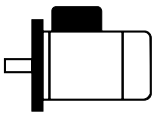
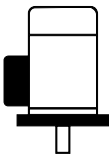
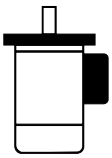
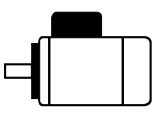
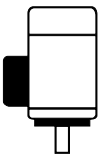
In case of converter-fed operation with frequencies greater than 60 Hz, special balancing is required to observe the specified limit values (high-speed version, special code “HS” in the type designation).

Types of construction

The most common types of construction are shown in the table below. Further types of construction can be supplied upon request. The type of construction is indicated on the rating plate in accordance with Code I, IEC/EN 60034-7. Standard motors which are ordered in a basic type in sizes 56 to 200 can also be operated with the following derived types of construction:

IM B3 in IM B5, IM B7, IM B8 and IM V6
IM B35 in IM 2051, IM 2061, IM 2071 and IM V36
IM B34 in IM 2151, IM 2161, IM 2171 and IM 2131
IM B5 in IM V3
IM B14 in IM V19

Motors of types IM V5, IM V1 or IM V18 can be designed with an optional protective canopy to prevent small parts falling into the motor. In accordance with the regulations, explosion-protected motors of these types are either provided with a protective canopy as standard, or else the user must make provisions to prevent small parts falling into the motor. With types of construction with the shaft end pointing upwards, it is the responsibility of the user to provide a suitable cover to prevent small parts falling into the fan cowl (see also standard IEC/EN 60079-0).
The cooling air flow must not be hindered by the cover.
From size 225, it is necessary to consult the manufacturer regarding types of construction IM V5, IM V6, IM B6, IM B7 and IM B8. The types of construction IM B5 and IM V3 are not available for frame sizes from 315 L.
To facilitate connection to the mains power supply, the terminal box can be rotated by 90° with all types of construction (with the exception of motors with an inclined terminal box 630 or 1000, where the terminal box can only be rotated by 180°).

Basic type of construction	Derived types of construction				
IM B3 IM 1001	IM V5 IM 1011	IM V6 IM 1031	IM B6 IM 1051	IM B7 IM 1061	IM B8 IM 1071
					
IM B35 IM 2001	IM V15 IM 2011	IM V36 IM 2031	– IM 2051	– IM 2061	– IM 2071
					
IM B34 IM 2101	– IM 2111	– IM 2131	– IM 2151	– IM 2161	– IM 2171
					
IM B5 IM 3001	IM V1 IM 3011	IM V3 IM 3031			
					
IM B14 IM 3601	IM V18 IM 3611	IM V19 IM 3631			
					

Bearings/bearing lubrication

VEM motors are fitted with anti-friction bearings from leading manufacturers. The nominal service lifetime of the bearings is at least 10,000 hours for 2-pole motors or 20,000 hours for motors with 4 or more poles, assuming full exploitation of the maximum permissible load. The nominal service lifetime of the bearings for motors installed in a horizontal position without additional axial load is 40,000 hours in coupled operation.

Under average operating conditions, with loads below the maximum permissible load, a nominal service life Lh10 of 10,000 hours can be achieved.

The design versions
– fixed bearing at N-end,
– without fixed bearing (floating bearing arrangement),
– permanent lubrication,
– relubrication device,
– heavy-duty bearing at D-end (for increased lateral forces),
– light-duty bearings,
as well as
– anti-friction bearing assignments
– disc and wave spring assignments
– V-ring assignments and
– illustrations of the bearing arrangements
can be taken from the bearing overviews. The corresponding flat grease nipples are specified in the tables of the design drawings. The bearings of motors in normal versions with two deep-groove ball bearings are preloaded by way of disc or wave springs. Exceptions to this rule are versions with cylindrical roller bearings at the D-end (heavy-duty bearing arrangement VL). The arrangement “fixed bearing at N-end” is available as an option for motors of the type “without fixed bearing”. Fixed bearings at the D-end are possible upon request.

The most important prerequisite for achievement of the nominal bearing lifetime is correct lubrication, i.e. use of the correct type of grease for the given application, filling with the correct amount of grease, and observance of the relubrication intervals.

The bearings of motors in sizes 56 to 160 are provided with lifetime lubrication. These bearings must be replaced in good time in accordance with maximum service life of the grease. For motors from size 180, the bearings must be relubricated in good time in accordance with maximum service life of the grease.

Under normal loads and operating conditions, a motor can be operated for approximately 10,000 hours in the case of 2-pole versions or approximately 20,000 hours in the case of versions with more than 2 poles before the grease in the anti-friction bearings must be replaced, unless agreed otherwise. The condition of the grease should nevertheless be checked from time to time already before this threshold is reached. In the case of permanently lubricated bearings, replacement of the bearing or grease should be planned at the latest after 4 years due to the gradually reduced lubricating properties of the grease over time. The specified numbers of operating hours apply only for operation at rated speed.

In case of converter-fed operation, the specified lubrication intervals must be reduced by approximately 25 % on account of the increased motor temperatures. If the nominal speed is exceeded in converter-fed operation, the relubrication interval is shortened approximately in inverse proportion to the increase in speed.

The bearing must be cleaned thoroughly using a suitable solvent before refilling with new grease. The same type of grease must be used. If the original type is not available, only the equivalent types specified by the motor manufacturer may be used as alternatives. It is important that the space in the bearing is only filled to approximately two-thirds of its capacity. Complete filling of the bearing and bearing cover with grease will lead to increased bearing temperatures and consequently increased wear.

Bearings fitted with a relubrication device are relubricated via the grease nipple while the motor is running. The appropriate amount of grease is specified for the particular motor. The relubrication intervals can be taken from the following table.

Size		2-pole version	4-pole version or greater
IEC/DIN series	Transnorm series		
132 to 280	100 to 250	2000 h	4000 h
315	280 to 315	2000 h	4000 h
355, 400	-	2000 h	3000 h

Use of cylindrical roller bearings

Relatively large radial forces or masses can be taken up at the end of the motor shaft where cylindrical roller bearings are used (“heavy-duty bearing arrangement” VL). Examples: Belt drives, pinions or heavy couplings. The minimum radial force at the shaft end must be a quarter of the permissible radial force. The permissible shaft end load is to be taken into account. The relevant specifications can be taken from the selection data tables and diagrams.

Important note:
If the radial force falls below the minimum value, damage to the bearings may result already within a few hours. Test runs without load are only permissible for short periods.

If the specified minimum radial force is not reached, we recommend the use of deep-groove ball bearings (“light-duty bearing arrangement” LL). The bearings can be changed upon request.

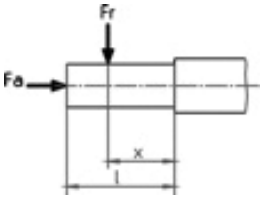
Loading of bearings and shaft end

The international standardisation of asynchronous motors means that the dimensioning of bearings and shafts can only be varied within certain limits. Consequently, an optimum design size has been selected.

Permissible shaft end loading

The permissible shaft end loading is determined by the following main criteria:
– Permissible bending of the shaft
– Shaft end fatigue strength
– Bearing lifetime

The following load diagram applies:



F_r = radial shaft end load
F_a = axial shaft end load
l = shaft end length
x = distance of the point of application of F_r from the shaft shoulder

Type-specific values for the permissible axial shaft end load F_a and the permissible radial shaft end load $F_{r0.5}$ (at point of application x : l = 0.5), $F_{r1.0}$ (at point of application x : l = 1.0) for the basic version and for the heavy-duty bearing arrangement with horizontal and vertical mounting of the motor are given in the tables in Chapter 2. The permissible axial shaft loads for sizes 315 L, 315 LX, 355 and 400 are available upon request. The permissible radial loads for motors mounted in horizontal and vertical positions are specified as dependent on the position of the point of application on the shaft end (taking into account the direction of the radial force in relation to gravity). The permissible loads given refer to installation of the motor practically free of vibration and load application planes as specified above. Verification of the shaft loading for size 355 can be provided by the manufacturer upon request. In general, the loads F_r and F_a are dependent on the transmission members used, i.e. on the axial and radial forces occurring at these transmission members, as well as their masses.

The forces are calculated in accordance with mechanical equations, e. g. for drive belt pulleys

$$F_r = 2 \cdot 10^7 \cdot \frac{P}{n \cdot D}$$ where

The permissible shaft end load (radial and axial forces) is based on a nominal bearing lifetime of 20,000 hours and a safety factor of > 2.0 regarding fatigue failure.

F_r = Radial force in N
P = Nominal output of the motor in kW (transmission power)
n = Nominal speed of the motor
D = Belt pulley diameter in mm
c = Pretensioning factor as specified by the belt manufacturer (for V-belts normally 2.5)

In practice, the radial force F_r is not always effective at x: l = 0.5. The permissible radial force can be calculated by way of linear interpolation over the range from x: l = 0.5 to x: l =1.0.

If the calculated shaft loads are greater than the permissible load, it is necessary to modify the drive elements. Possible modifications include:
– Selection of a larger belt pulley diameter
– Use of V-belts instead of flat belts
– Selection of a different pinion diameter or bevel angle
– Selection of a different coupling version, etc.

In general, it should be ensured that the resulting point of application of force F_r does not lie beyond the shaft end as far as possible. If no solution can be found, the manufacturer would be glad to investigate special constructions with which problems of this kind can be handled.

Bearing monitoring

To permit monitoring of the condition of the bearings, motors can be fitted with or prepared for the fitting of temperature, shock pulse and vibration sensors. PT100-type temperature sensors can be mounted at the bearing points in 2-, 3- or 4-wire configurations. The sensors are connected at the main terminal box or else in a separate box mounted either on the main terminal box or on the motor housing, depending on the individual design. For monitoring of the wear of the anti-friction bearings, shock pulse sensors [SPM] can be mounted on the end shields from size 132. This permits monitoring by way of mobile recording units. It is also possible to use hard-wired shock pulse or vibration sensors to enable remote monitoring.

Use of insulated bearings

When motors are operated on the mains, magnetic asymmetries result in a voltage along the shaft. This shaft voltage causes compensating currents to flow between the rotor and stator via the anti-friction bearings. If the voltage exceeds a threshold of 500 mV, the bearings may be damaged. The design of VEM standard motors ensures that this value can never be exceeded.

Such effects may be intensified in case of converter-fed operation. The converter design is a decisive influencing factor. Pulse-controlled converters produce especially high-frequency voltages and currents dependent on the pulse frequency and the pulse modulation. Output filters in the converter minimise these effects. To avoid bearing damage, motors for converter-fed operation from size 315 MY are always fitted with an insulated bearing on the non-drive end.

In addition to this measure, it is always imperative to provide for proper earthing of the motor housing in order to drain the currents circulating between the converter and stator.

Shaft ends

IEC 60034-7 defines the two sides of a motor as follows:
D-end (DS): Drive side of the motor (drive side)
N-end (NS): Side of the motor opposite the drive (non-drive side)
Centre holes in accordance with DIN 332, sheets 1 and 2, form DS.

The keys and keyways are machined in accordance with DIN 6885 sheet 1, form A or B for frame sizes 56 – 112 and in accordance with DIN 6885 sheet 1, form A for frame sizes 132 – 355. The lengths of the keys comply with EN 50347 for shaft heights 132 – 355.

Threads for fitting and pulling fixtures

Shaft end diameter	Thread
from 7 to 10 mm	M3
from 10 to 13 mm	M4
from 13 to 16 mm	M5
from 16 to 21 mm	M6
from 21 to 24 mm	M8
from 24 to 30 mm	M10
from 30 to 38 mm	M12
from 38 to 50 mm	M16
from 50 to 85 mm	M20
from 85 to 130 mm	M24

The motors are always supplied with the shaft key inserted.

The second shaft is able to transmit the full nominal output in the case of a coupled drive. The output transmitted by the second shaft end in the case of belt, chain and pinion drives can be notified upon request. Slotted drive elements, such as belt pulleys or couplings, must be balanced with a half-key to at least balance quality grade G 6.3 according to DIN ISO 1940-1.

True running of the shaft ends

The true running of the shaft ends complies with the requirements of EN 50347. The relevant values can be reduced

Noise ratings

Noise levels are measured at rated output, rated voltage and rated frequency in accordance with EN ISO 3741. IEC/EN 60034-9 stipulates that the noise level in dB(A) is to be specified as the spatial mean value of the sound pressure level LpA measured at a distance of 1 metre from the machine contour.
The A-weighted sound power level L_{WA} over the measuring surface L_S (d = 1 m) is calculated with

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

The measuring surface level is dependent on the machine geometry and is for

		L_S (dB)
Frame size	56 – 132	12
	160 – 225	13
	250 – 315	14
	355	15

The noise values for the main series are presented in tabular form. For machines in 60 Hz versions, a value 4 dB(A) higher than the table value can be taken as a guideline. Binding specifications for 60 Hz upon request. Consultation is necessary with regard to special series.

Winding and insulation

VEM motors of the series W…/K2../S…/P…/A... are designed for thermal class 155 [F] as standard. High-quality enamelled wires and insulating sheet materials are used in conjunction with low-solvent resin impregnation. The standard insulation system accommodates rated voltages up to 725 V [mains feed]. It guarantees high mechanical and electrical strength, and provides for a long service life.

Motors are available in three versions:
For converter-fed operation without filter up to 420 V converter output voltage
For converter-fed operation without filter up to 500 V converter output voltage, curve A to DIN VDE 0530-25:2009
For converter-fed operation without filter up to 690 V converter output voltage, curve B to DIN VDE 0530-25:2009

According to VIK recommendation 04.2011, point 6.7 / NAMUR recommendation NE38, motors may be subjected to a maximum peak voltage of 1350 V in accordance with DIN IEC/TS 60034-17, figure 6, and a rate of voltage rise du/dt of 1.5 kV/µs at the motor terminals. Higher peak voltages must be agreed.

Accordingly, converter-fed VIK motors from size 132 [except 132 T] to 400 are designed as K2.R/W..R/PE.R motors unless other peak voltages are agreed separately.

Rated voltage and frequency

In their basic versions, motors are supplied for the following rated voltages and frequencies:
230/400 V Δ/Y, 50 Hz
400/690 V Δ/Y, 50 Hz
500 V, 50 Hz

275/480 V Δ/Y, 60 Hz
600 V, 60 Hz

The motors can be operated without modification of the rated output on mains systems where the voltage at rated frequency deviates by up to +5 % from the nominal value (rated voltage range A). At rated voltage, the frequency in these mains systems may deviate by ±2 % from the nominal value. The aforementioned standard voltages to DIN IEC 60038 are taken to define the design point. Special voltages and frequencies are possible by customer request.

Motors of the series K21./K20. which are to be suitable for a mains voltage to DIN IEC 60038 with an overall tolerance of ±10 % are selected according to the corresponding rated voltage as listed in the technical tables. The rated voltage range limited by U_U and U_O is similarly specified there.

An additional tolerance of ± 5% applies at these voltage limits. In accordance with IEC/EN 60034-1, it is permissible for the temperature to exceed the limit values for the corresponding thermal class by up to 10 K during operation at the voltage limits.

For motors of sizes 56 to 112 (DIN)/56 to 100 (progressive series), the current for the upper voltage range U_O is set such that, given normal setting of the motor circuit-breaker to 1.05 x I_n, the breaker will also not be tripped in no-load operation and at ±5 % tolerance.

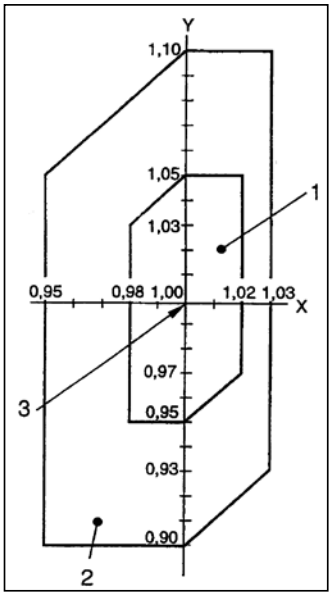
Motors with IE classifications can also be supplied for an extended voltage range. In this case, the preferred form of marking is to specify the corresponding range in accordance with IEC/EN 60034-1.

When the rated voltage is indicated alongside the specification of

Zone A or B

in accordance with IEC/EN 60034-1, it is only necessary to specify the efficiency class (IE code) and the efficiency rating at this voltage, e. g.

400/690 V (Zone B) Δ/Y.



Voltage and frequency limits for motors in accordance with IEC/EN 60034-1

1 Range A
2 Range B
3 Design point
X Relative frequency f/f_N
Y Relative voltage U/U_N

In accordance with IEC/EN 60034-1, a voltage tolerance of ± 10% applies.

An alternative possibility is a marking such as

400/690 V ±5 % (Zone A) Δ/Y.

This variant is used especially for explosion-protected motors complying with the VIK recommendation of 2011. In this case, assuming a voltage of 400 V, an overall voltage tolerance of ±10 % and a **frequency tolerance of only ±2 % of Range A according to IEC/EN 60034-1 would apply.**

Voltage selection according to VIK Recommendation 1, Three-Phase Asynchronous Motors – Technical Requirements (excerpt from VIK Recommendation 1 as per March 2011),

Voltage

230 V/400 V*	±5 %**	50 Hz, **Δ/Y**
400 V/690 V*	±5 %**	50 Hz, **Δ/Y**
290 V/500 V		50 Hz, **Δ/Y**

* Rated voltage in accordance with DIN IEC 60038
** Rated voltage range

The torque must be maintained without limitations across a further tolerance range of ±5 %. No rated voltage range is required for motors with a rated voltage of 290 V/500 V.

In the case of explosion-protected motors for which a rated voltage range is specified, the motor warming at the tolerance limits (rated range limit plus additionally ±5 %) must not exceed the permissible limit temperature. The specified permissible voltage tolerances of the motor must be observed.

Notes on marking of the IE classification (according to IEC/EN 60034-30-1)

Motors with more than one rated voltage/frequency/output combination may be assigned a rated efficiency and a rated efficiency class for each rated voltage/frequency/output combination. As a minimum requirement, however, the lowest efficiency value and the associated IE code (of all rated voltage/frequency/output combinations) must always be indicated on the rating plate. All efficiency values (50%, 75% and 100 % load) and their corresponding IE codes must be specified in the product documentation (catalogue or operating instructions). Rated voltage/frequency combinations with the same magnetic flux and output, for example 230/400 V (delta/star) or 230/460 V (double-star/star), must only be assigned one rated efficiency and one efficiency class (IE code).
NOTE: In Japan, for example, the rating combination “200 V/50 Hz – 200 V/60 Hz – 220 V/60 Hz” is typical, while in Europe, the rating combination “380 V/50 Hz – 400 V/50 Hz – 415 V/50 Hz – 460 V/60 Hz” is sometimes used. For these examples, there will be either three or four efficiency ratings, respectively, and several different IE codes may apply.

Rated output

The specified rated output applies for continuous operation to IEC/EN 60034-1 and refers to a coolant temperature of 40 °C, installation at an altitude ≤ 1,000 m above sea level, operating frequency 50 Hz and rated voltage. The series K11R/ K21R, K10R/K20R and W... possess thermal reserves which permit the following type-dependent continuous loads:
– Output up to 10 % above rated output at coolant temperature 40 °C
– Rated output up to coolant temperature 50 °C
– Rated output at altitudes up to 2,500 m

In such cases, consultation with the manufacturer is recommended.

Alternative conditions do not apply in the case of explosion-protected motors. Such motors may only be operated up to the values specified on the rating plate.

Motor torque

The rated torque (in Nm) delivered at the motor shaft amounts to

$$M = 9550 \cdot \frac{P}{n}$$

where P = Rated output in kW
n = Speed in rpm

In the motor selection data, the starting, pull-up and breakdown torques are given as multiples of the rated torque.

If the voltage deviates from its rated value, this results in an approximately quadratic change in the torque.

Ambient temperature

All VEM motors are suitable for ambient temperatures from -20 °C to +40 °C in their basic versions. Motors can be used at ambient temperatures down to -40 °C, provided they have been ordered specifically for such conditions.

In case of deviating ambient temperatures at installation sites below 1,000 m above sea level, the following factors are applied to determine the permissible output, depending on the thermal class:

Coolant temperature °C	10	15	20	25	30	35	40	45	50	55	60	70
Thermal class factor F	1.21	1.17	1.14	1.10	1.07	1.03	1.00	0.95	0.90	0.85	0.80	0.68

Factors for adjustment of the permissible output in case of deviating coolant temperatures

If frequent moisture condensation is to be expected at the place of motor installation, we recommend the use of a space heater or other suitable precautions.

Installation altitude

Unless specified otherwise by the customer, it is assumed that the place of installation is not more than 1,000 m above sea level. If the machine is to be operated at an altitude above 1,000 m but below 4,000 m above sea level, the rated output is subject to the adjustment factors specified in the table to the right:

In case of installation at altitudes > 4,000 m, the limit values for temperature rise must be agreed separately between the manufacturer and the customer.
.

Altitude above seal level in m	Coolant temperature in °C					
	< 30	30–40	45	50	55	60
1000	1.07	1.00	0.95	0.90	0.85	0.80
1500	1.04	0.97	0.93	0.89	0.84	0.79
2000	1.00	0.94	0.90	0.86	0.82	0.77
2500	0.96	0.90	0.86	0.83	0.78	0.74
3000	0.92	0.86	0.82	0.79	0.75	0.70
3500	0.88	0.82	0.79	0.75	0.71	0.67
4000	0.82	0.77	0.74	0.71	0.67	0.63

Adjustment factors for altitude/coolant temperature

Overload capacity

In accordance with IEC/EN 60034-1, all motors can be subjected to the following overload conditions:
– 1.5 x rated current for a duration of 2 minutes
– 1.6 x rated torque for a duration of 15 seconds

Both conditions apply for rated voltage and rated frequency

Rated efficiency and power factor

The efficiency η and the power factor cos φ are given in the lists of motor selection data.

In the case of motors with IE classification, values are specified for the efficiency at 100/75/50 % load.

Restarting with residual field and phase opposition

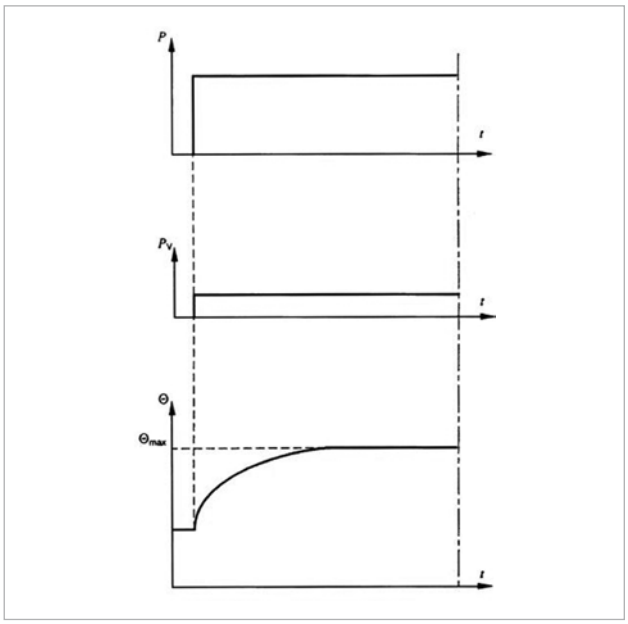
When an electric machine is switched off, a voltage system remains effective in its winding for a short time on account of the decaying magnetic field. Restarting could result in transient electrodynamic reactions in the machine. VEM motors can be restarted against a 100 % residual field after mains failure.

Motor protection

Upon request, the following motor protection variants are possible:
– Motor protection with PTC thermistors as temperature sensors in the stator winding
– Bi-metal temperature sensor as normally closed or normally open contact in the stator winding (not for explosion-protected motors for the gas sector)
– KTY silicon sensors
– Resistance thermometer for winding or bearing temperature monitoring
– Bearing vibration diagnosis

Duty cycles

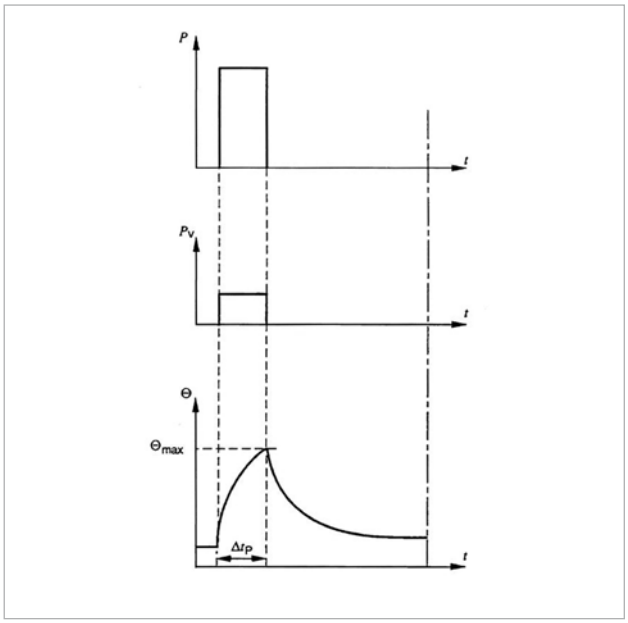
Special duty cycles for switched operation, short-time operation or electric braking are possible upon request.
IEC/EN 60034-1 defines the following nominal duty cycles, which take into account thermal and mechanical conditions:



Duty cycle S1 – Continuous duty
Operation with a constant load which remains effective for a sufficient duration for the machine to reach thermal equilibrium. If no duty cycle is indicated on the rating plate, the motor is designed for continuous duty S1.

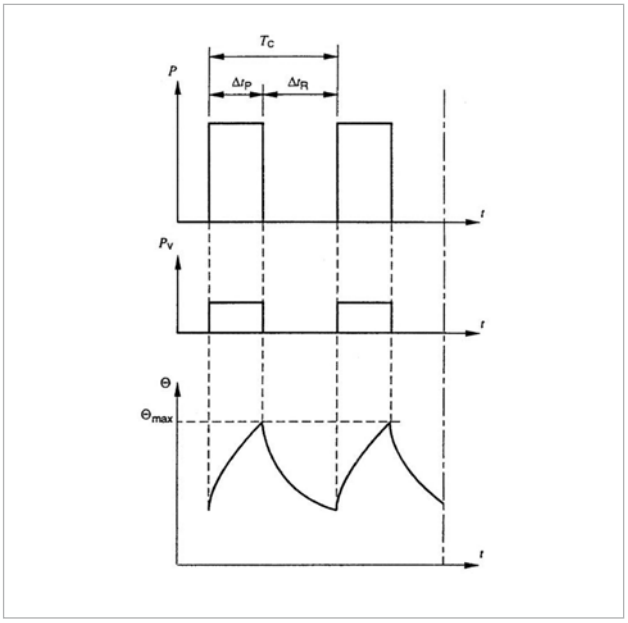
In the motor selection data lists, the rated data are specified for this duty cycle.

P	Load
P_V	Electrical losses
Θ	Temperature
Θ_{max}	Maximum temperature
t	Time



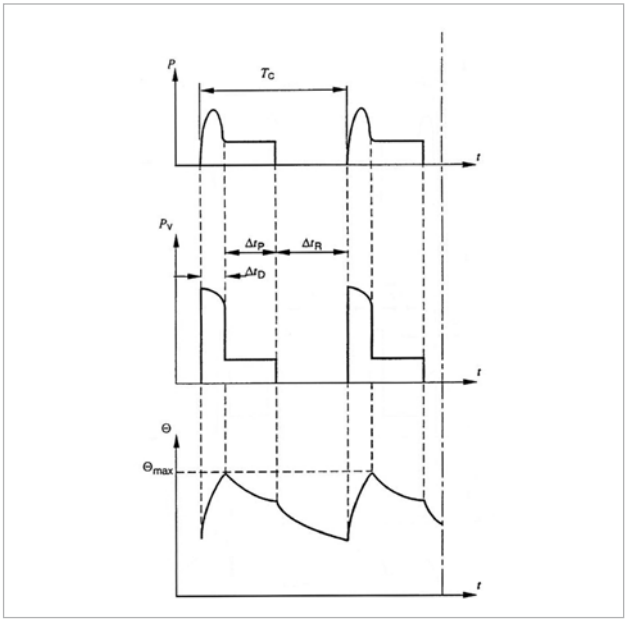
Duty cycle S2 – Short-time duty
Operation with a constant load which does not remain effective for a sufficient duration for the machine to reach thermal equilibrium, and a subsequent period of standstill with de-energised windings which is sufficient for the machine temperature to fall back to a level which deviates from the temperature of the coolant by less than 2 K. In case of duty cycle S2, the duration of operation must be specified.

P	Load
P_V	Electrical losses
Θ	Temperature
$Θ_{max}$	Maximum temperature
t	Time
$Δ t_P$	Duration of operation at constant load



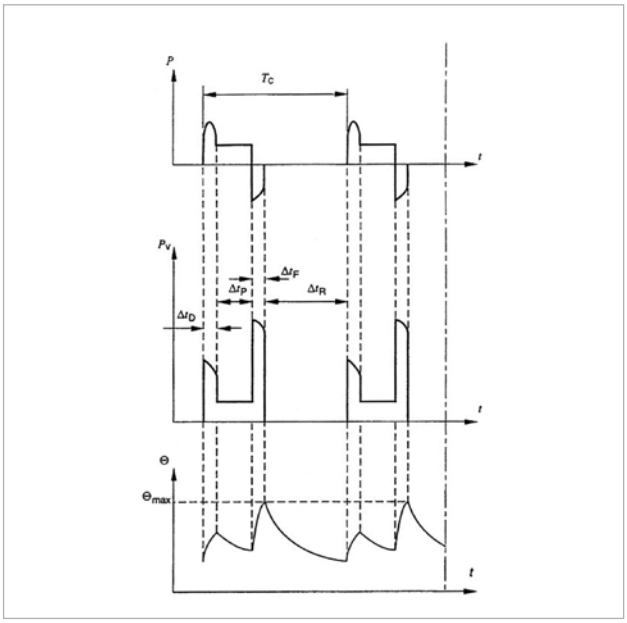
Duty cycle S3 – Intermittent periodic duty
Operation which comprises a succession of identical cycles, each of which consists of a period of operation with constant load and a period of standstill with de-energised windings, where the starting current does not significantly influence the temperature rise. The specification of this duty cycle must be accompanied by indication of the cyclic duration factor. Periodic duty means that the state of thermal equilibrium is not reached during the period of the load.

P	Load
P_V	Electrical losses
Θ	Temperature
$Θ_{max}$	Maximum temperature
t	Time
T_C	Cycle duration
$Δ t_P$	Duration of operation at constant load
$Δ t_R$	Duration of standstill with de-energised windings
	Cyclic duration factor $= Δ t_P/T_C$



Duty cycle S4 – Intermittent periodic duty with starting
Operation which comprises a succession of identical cycles, each of which consists of a distinct starting period, a period of operation with constant load and a period of standstill with de-energised windings. The specification of this duty cycle must be accompanied by indication of the cyclic duration factor, the mass moment of inertia of the motor and the mass moment of inertia of the load, with the latter both referring to the motor shaft. Periodic duty means that the state of thermal equilibrium is not reached during the period of the load.

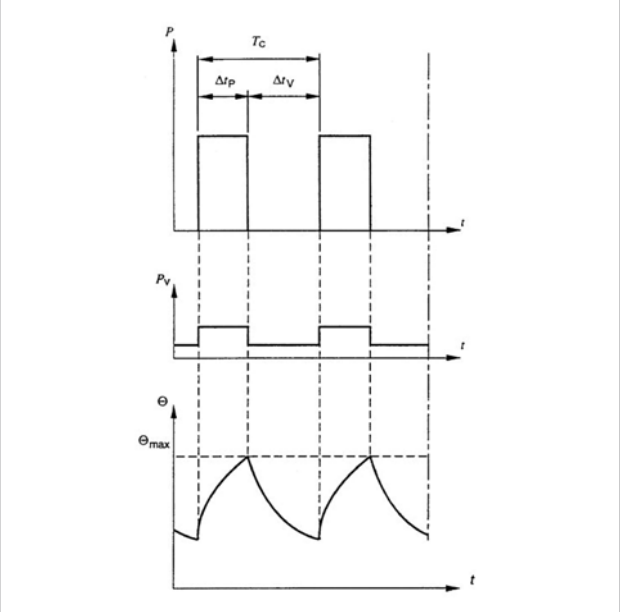
P	Load
P_V	Electrical losses
Θ	Temperature
$Θ_{max}$	Maximum temperature
t	Time
T_C	Cycle duration
$Δ t_D$	Starting period
$Δ t_P$	Duration of operation at constant load
$Δ t_R$	Duration of standstill with de-energised windings
	Cyclic duration factor $= (Δ t_D + Δ t_P)/T_C$



Duty cycle S5 – Intermittent periodic duty with electric braking

Operation which comprises a succession of identical cycles, each of which consists of a starting period, a period of operation with constant load, a period of electric braking and a period of standstill with de-energised windings. The specification of this duty cycle must be accompanied by indication of the cyclic duration factor, the mass moment of inertia of the motor and the mass moment of inertia of the load, with the latter both referring to the motor shaft. Periodic duty means that the state of thermal equilibrium is not reached during the period of the load.

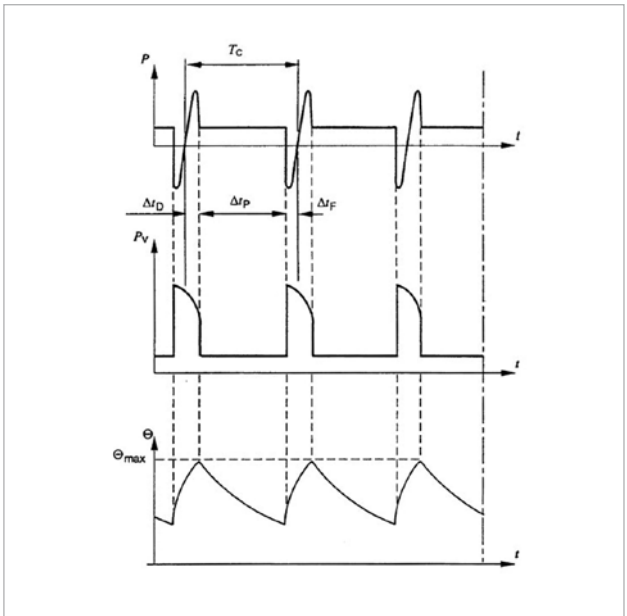
P	Load
P_V	Electrical losses
Θ	Temperature
Θ_{max}	Maximum temperature
t	Time
T_C	Cycle duration
Δt_D	Starting period
Δt_P	Duration of operation at constant load
Δt_F	Duration of electrical braking
Δt_R	Duration of standstill with de-energised windings
	Cyclic duration factor = $(\Delta t_D + \Delta t_P + \Delta t_F)/T_C$



Duty cycle S6 – Continuous operation periodic duty

Operation which comprises a succession of identical cycles, each of which consists of a period of operation with constant load and a period of no-load operation. No standstill with de-energised windings occurs. The specification of this duty cycle must be accompanied by indication of the cyclic duration factor. Periodic duty means that the state of thermal equilibrium is not reached during the period of the load.

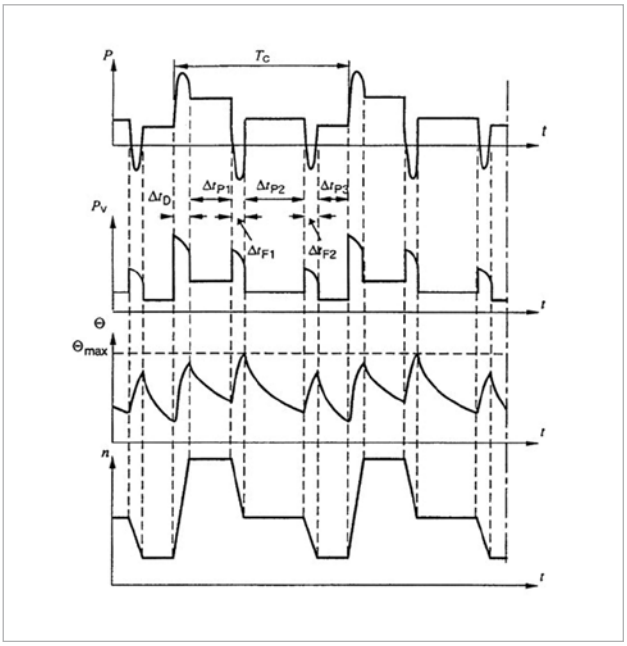
P	Load
P_V	Electrical losses
Θ	Temperature
Θ_{max}	Maximum temperature
t	Time
T_C	Cycle duration
Δt_D	Starting period
Δt_P	Duration of operation at constant load
Δt_V	Duration of no-load operation
	Cyclic duration factor = $\Delta t_P/T_C$



Duty cycle S7 – Continuous operation periodic duty with electric braking

Operation which comprises a succession of identical cycles, each of which consists of a starting period, a period of operation with constant load and a period of electric braking. No standstill with de-energised windings occurs. The specification of this duty cycle must be accompanied by indication of the mass moment of inertia of the motor and the mass moment of inertia of the load (both referring to the motor shaft).

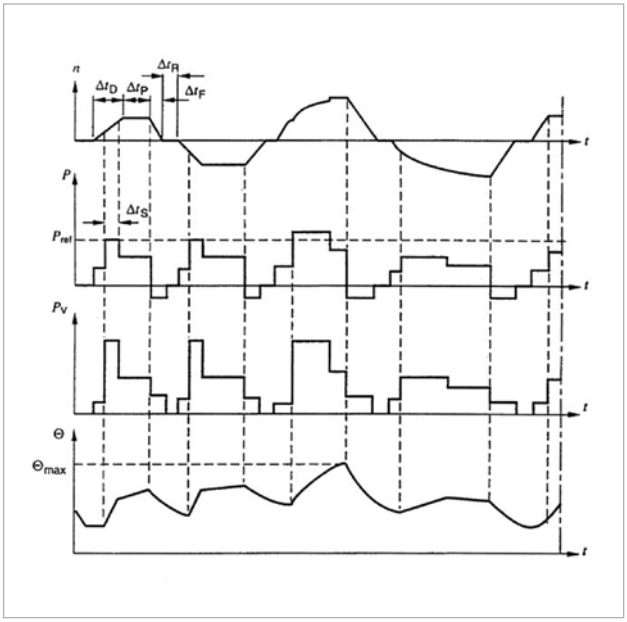
P	Load
P_V	Electrical losses
Θ	Temperature
Θ_{max}	Maximum temperature
t	Time
T_C	Cycle duration
Δt_D	Starting period
Δt_P	Duration of operation at constant load
Δt_F	Duration of electrical braking
	Cyclic duration factor = 1



Duty cycle S8 – Continuous operation periodic duty with related changes in load and speed

Operation which comprises a succession of identical cycles, each of which consists of a period of operation with constant load and at a certain speed, followed by one or more periods of operation with other constant loads in accordance with different speeds. (This may be the case with pole-changing asynchronous motors, for example.) No standstill with de-energised windings occurs. The specification of this duty cycle must be accompanied by indication of the mass moments of inertia of the motor and load (both referring to the motor shaft), as well as the load, speed and cyclic duration factor for each relevant speed.

P	Load
P_V	Electrical losses
Θ	Temperature
Θ_{max}	Maximum temperature
n	Speed
t	Time
T_C	Cycle duration
Δt_D	Starting period
Δt_P	Duration of operation at constant load (P1, P2, P3)
Δt_F	Duration of electrical braking (F1, F2)



Duty cycle S9 – duty with non-periodic load and speed variations

Operation characterised by no more than four discrete loads (or equivalent loads), each of which remains effective for a sufficient duration for the machine to reach thermal equilibrium. The smallest load within this duty cycle may be zero (no-load operation or standstill with de-energised windings). For this duty cycle, a suitable constant load corresponding to duty cycle S1 must be selected as the reference value for the individual loads.

P	Load
P_{ref}	Reference load
P_V	Electrical losses
Θ	Temperature
Θ_{max}	Maximum temperature
n	Speed
t	Time
Δt_D	Starting period
Δt_P	Duration of operation at constant load
Δt_F	Duration of electrical braking
Δt_R	Duration of standstill with de-energised windings
Δt_S	Duration of overload

Duty cycle S10 – Operation with discrete constant loads and speeds

Operation characterised by no more than four discrete loads (or equivalent loads), each of which remains effective for a sufficient duration for the machine to reach thermal equilibrium. The smallest load within this duty cycle may be zero (no-load operation or standstill with de-energised windings).

For this duty cycle, a suitable constant load corresponding to duty cycle S1 must be selected as the reference value for the individual loads.

Paint finish

An attractive appearance combined with resilient corrosion protection, while at the same time taking into account all relevant demands relating to environmental protection and occupational health and safety – that is the essential objective to be met by all paint finishes applied to our motors. Paint finishes must withstand the most diverse stresses and influences in order to ensure long-term reliable protection. With the switch to low-solvent paint systems, VEM has adapted its production to the tightened demands of the 31st Ordinance on Implementation of the Federal Immission Control Act (Ordinance regarding the reduction of VOC emissions resulting from the use of organic solvents in specific installations – German Solvent Ordinance) [31. BImSchV] and is thus making an active contribution to the improvement of environmental protection.

Normal paint finish
- Suitable for climate group “Moderate” in accordance with IEC 60721-2-1
- Indoor and outdoor installation, moderate climate (short-time exposure to relative humidity up to 100 % at temperatures up to +30 °C; continuous exposure to relative humidity up to 85 % at up to +25 °C)

Special paint finish
- Suitable for climate group “Worldwide” in accordance with IEC 60721-2-1
- Outdoor installation in atmospheres with a general tendency to increased stress, tropical climate (short-time exposure to relative humidity up to 100 % at temperatures up to +35 °C; continuous exposure to relative humidity up to 98 % at up to +30 °C

VEM paint systems provide lasting, high-performance corrosion protection. Their functional capabilities have been proven in exacting and comprehensive test series.

Customer-specific paint systems are always subject to prior consultation.

Nr.	Designation	Installation conditions
01/ 01S	**„M“ Moderate Thermal class 155/180**	Normal finish “M”, climate group “Moderate M” to DIN IEC 721-2 1 Indoor installation, outdoor installation under cover **Corrosion class “C2 – Low” according to EN ISO 12944-2:1998** **Finish 01 in RAL 7031 for thermal classes F and H** **Finish 01S for special colours, thermal class F only**
02/ 02S	**„W“ worldwide Thermal class 155/180**	Climate-specific finish “W”, climate group “Worldwide” to DIN IEC 721-2-1 Outdoor installation in temperate climates, installation in damp rooms, industrial atmosphere, tropical climates, desert climates, cold climates, agriculture (MO, AS, SS, TII), VIK version, Roller table motors ARB, ARC, A10O, A11O, A10G, A11G, **Corrosion class “C2–C3 – Low to medium” acc. to EN ISO 12944-2:1998,** **Finish 02 in RAL 7031 for thermal classes F and H,** **Finish 02S for special colours, thermal class F only**
03	**Customer request**	Special paint system to customer specification
04	**Special finish “Marine/ports”**	Special finish for marine climates and port environments
06	**“M”/“W” Thermal class 180**	Climate-specific finish “M and W” to DIN IEC 721-2-1 special colours for thermal class H **Corrosion class “C2–C3 – Low to medium” acc. to EN ISO 12944-2:1998** **Finish 06 for special colours, thermal class H**
07	**Special finish “Chemicals” Thermal class 180**	Special finish suitable for decontamination, extreme chemical and thermal resilience, high corrosion protection, **Corrosion class “C3 – Medium” acc. to EN ISO 12944-2:1998**
08	**Primed**	Motors without winding, built-on motors, primed motors with core in place
09 L	**Light-duty offshore finish**	Outdoor installation, UV-resistant, high corrosion protection, **Corrosion class “C3–C4 – Medium to high” acc. to EN ISO 12944-2:1998**
09 S	**Heavy-duty offshore finish**	Offshore applications, drilling rigs, further enhanced corrosion protection, UV-resistant, **Corrosion class “C4/C5 – High to very high” (industry, marine) acc. to EN ISO 12944-2:1998**
10 L	**General Ex finish > 200 µm, light-duty offshore version**	General Ex finish > 200 µm, Outdoor installation, UV-resistant, high corrosion protection **Corrosion class “C3–C4 – Medium to high” acc. to EN ISO 12944-2:1998**
10 S	**General Ex finish > 200 µm, heavy-duty offshore version**	General Ex finish > 200 µm, Offshore applications, drilling rigs, further enhanced corrosion protection, UV-resistant, **Corrosion class “C4/C5 – High to very high” (industry, marine) acc. to EN ISO 12944-2:1998**

01 Moderate WK F/H RAL 7031	01 S Moderate WK F	02 worldwide WK F/H RAL 7031 Special colour	04 Special finish	06 Moderate/ worldwide WK H RAL 7031 Special colour	07 Special finish	08 Primed	08 S Unpainted (component primer only)	09 L Light-duty offshore finish	09 S Heavy-duty offshore finish	10 L Special finish	10 S Special finish
Heat, indoors, outdoors under cover	Heat, indoors, outdoors under cover	Heat, outdoors, indoors with high humidity	Marine climate, ports	Heat, humidity, outdoors	Chemicals, heat, humidity, high corrosion protection	Prepared for further painting	Prepared for further painting	UV-resis-tant, outdoors, high corrosion protection	Offshore marine climate, further enhanced corrosion protection	General Ex finish > 200 µm, high corrosion protection	General Ex finish > 200 µm, further enhanced corrosion protection
> 60 µm	> 60 µm	> 90 µm	> 150 µm	> 130 µm	> 140 µm	> 60 µm		> 210 µm	> 240 µm	> 210 µm	> 240 µm
up to 120 °C short-time 160 °C	up to 100 °C short-time 120 °C	up to 120 °C short-time 160 °C	up to 100 °C short-time 140 °C	up to 120 °C short-time 160 °C	up to 120 °C short-time 160 °C			up to 100 °C short-time 140 °C	up to 100 °C short-time 140 °C	up to 100 °C short-time 140 °C	up to 100 °C short-time 140 °C
KK C2	KK C2	KK C2 – C3	KK C3 – C4	KK C2 – C3	KK C3			KK C4	KK C5	KK C4	KK C5
									2K-PUR TC 80 µm		2K-PUR TC 40 µm
								2K-PUR TC 80 µm		2K-PUR TC 40 µm	2K-PU conductive paint, min. 100 µm
			2K-PUR TC 40 µm		2K-EP TC 40 µm				2K-EP primer 110 µm	2K-PU conductive paint, min. 100 µm	
				2K-PUR TC 60 µm	2K-PUR TC 30 µm			2K-EP primer 100 µm			2K-EP primer 50 µm
2K-EP TC 30 µm	2K-PUR TC 30 µm	2K-PUR TC 60 µm	2K-EP primer 80 µm	2K-EP primer. 40 µm	2K-EP primer. 40 µm	1K-primer 30 µm				2K-EP 40 µm	
Grey cast iron/fan cowls: Water-thinned primers, approx. 30 µm			KTL primer approx. 30 µm	Grey cast iron/fan cowls: Water-thinned primers, approx. 30 µm				KTL primer approx. 30 µm	2K-EP zinc dust 50 µm	KTL primer approx. 30 µm	2K-EP zinc dust 50 µm
Surfaces must be dry and free of dirt, rust, grease, scale and release agent / Aluminium terminal boxes and aluminium terminal box covers: Washed and Metaclean or HAKUPUR 700											

Paint systems used by VEM motors Thurm GmbH, motor sizes 56...132

01 Moderate WK F/H RAL 7031	01 S Moderate WK F	02 worldwide WK F/H RAL 7031	02 S worldwide WK F Special colour*	04 Special finish	06 Moderate/ worldwide WK H Special colour*	07 Special finish	08 Primed	09 L Light-duty offshore finish	09 S Heavy-du-ty offshore finish	10 L Special finish	10 S Special finish
Heat, indoors, outdoors under cover	Heat, indoors, outdoors under cover	Heat, outdoors, indoors with high humidity	Heat, outdoors, indoors with high humidity	Marine climate, ports	Heat, humidity, outdoors	Chemicals, Heat, humidity, high corrosion protection	Prepared for further painting	UV-resis-tant, out-doors, high corrosion protection	Offshore marine climate, further enhanced corrosion protection	General Ex finish > 200 µm, high corrosion protection	General Ex finish > 200 µm, further enhanced corrosion protection
> 70 µm	> 70 µm	> 110 µm	> 110 µm	> 150 µm	> 110 µm	> 150 µm	> 70 µm	> 210 µm	> 240 µm	> 210 µm	> 240 µm
up tp 120 °C short-time 180 °C	up tp 100 °C short-time 120 °C	up tp 120 °C short-time 180 °C	up tp 100 °C short-time 120 °C	up tp 80 – 90 °C short-time 130 °C	up tp 120 °C short-time 180 °C	up tp 120 °C short-time 180 °C		up tp 100 °C short-time 140 °C	up tp 100 °C short-time 140 °C	up tp 100 °C short-time 140 °C	up tp 100 °C short-time 140 °C
KK C2	KK C2	KK C2 – C3	KK C2 – C3	KK C3 – C4	KK C2 – C3	KK C3		KK C4	KK C5	KK C4	KK C5
											2K-PUR TC 40 µm
									2K-PUR TC 80 µm	2K-PUR TC 40 µm	2K-PU conductive paint, min. 100 µm
								2K-PUR TC 80 µm	2K-EP primer 110 µm	2K-PU conductive paint, min. 100 µm	2K-EP primer 50 µm
						2K-EP TC 40 µm		2K-EP primer 100 µm			
2K-EP TC 40 µm	2K-PUR TC 40 µm	2K-EP TC 40 µm	2K-PUR TC 40 µm	2K-EP, ceramic-filled 120 µm	2K-EP TC 40 µm	2K-EP primer 80 µm	2K-EP primer 40 µm		2K-EP zinc dust 50 µm	2K-EP primer 40 µm	2K-EP zinc dust 50 µm
2K-EP primer 40 µm	2K-EP primer 40 µm				2K-EP primer 40 µm					Component primer-filled	
Grey cast iron/fan cowls: Water-thinned primers, approx. 30 µm Sheet steel terminal boxes: Powder-coated											
Grit blasting with SA 2.5/SIS 055900 for grey cast iron parts Cleaning/pickling for sheet metal parts											

Special colour*: Paint finish 01 not available in RAL 1000 to 2011, RAL 7047, 9001, 9002, 9005, 9010, 9011, 9016, 9017 and light ivory textured paint 1015, KK

Paint systems used by VEM motors GmbH, motor sizes 160...400

The specified layer thicknesses are the target thicknesses which are normally attained by the painting process. Certain process-inherent fluctuations are inevitable, however, due to the geometric properties of the final product and the realisation of spray painting by hand.

Coating thickness measurements performed for our customers indicate merely the average value from several individual measurements.

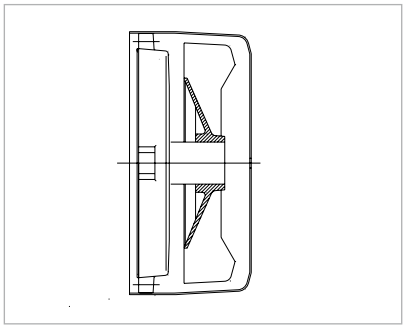
If no colour is specified, all motors are supplied in **RAL 7031 “Blue grey”.**

If a different colour is required, the corresponding RAL number and colour designation must be specified at the time of ordering.

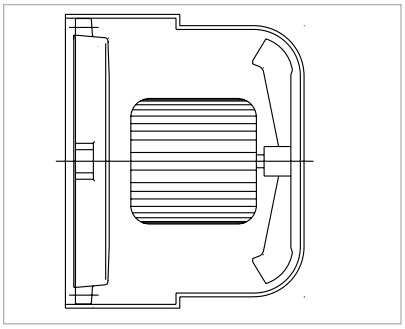
A top coat is only applied to the inside of the fan cowl and the N-end of the motor with paint systems 04 and 07. With paint system 09L/10L, only the N-end of the motor receives a top coat. Paint systems 09S/10S comprise printing of the inside of the fan cowl and full realisation of the paint coating (up to 200 µm) also on the N-end of the motor.

Modular construction of different series and modifications

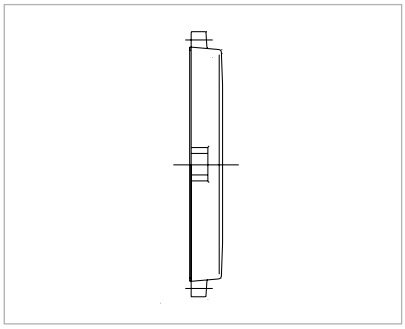
The design concepts of the different series provide for the optional incorporation of components such as encoders, tacho generators, brakes, speed monitors or forced ventilation units to solve the customer‘s individual control tasks.



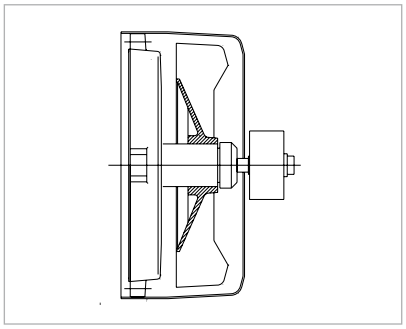
Standard version
Type of cooling IC 411, self-ventilated



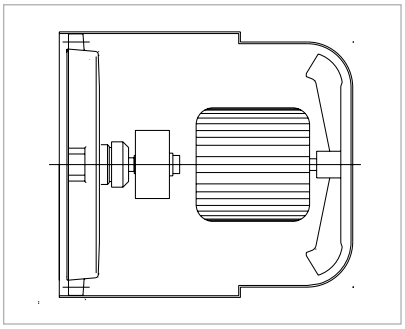
Special version
Type of cooling IC 416, forced ventilation



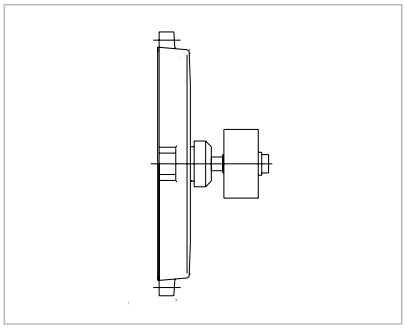
Special version
Type of cooling IC 410, non-ventilated



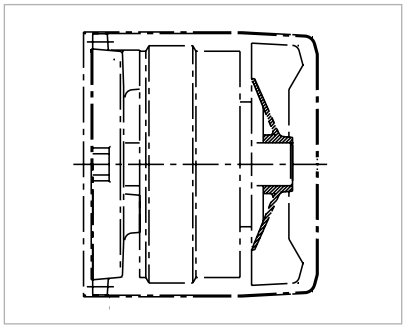
Special version
Type of cooling IC 411, self-ventilated
with built-on incremental encoder



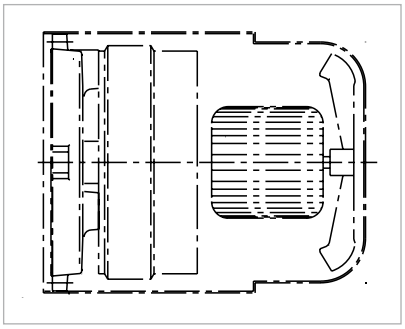
Special version
Type of cooling IC 416, forced ventilation
with built-on incremental encoder



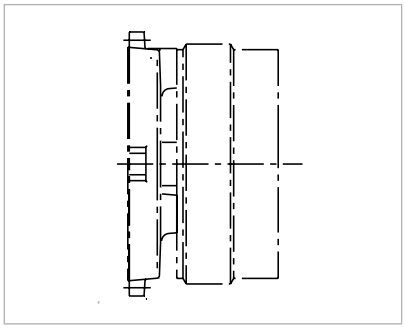
Special version
Type of cooling IC 410, non-ventilated
with built-on incremental encoder



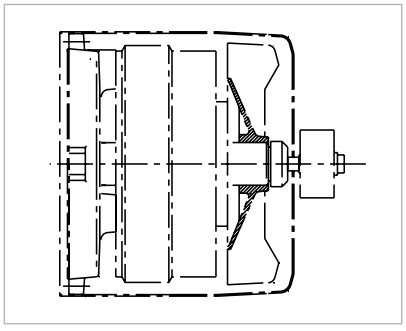
Special version
Type of cooling IC 411, self-ventilated
with built-on brake



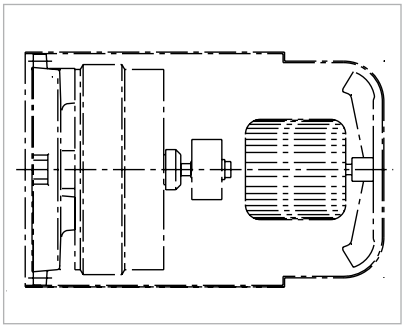
Special version
Type of cooling IC 416, forced ventilation
with built-on brake



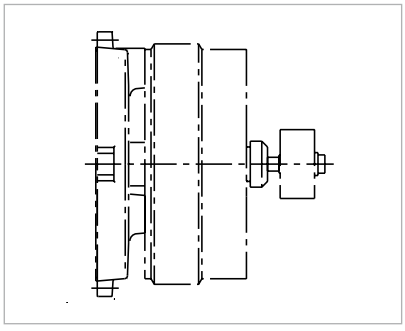
Special version
Type of cooling IC 410, non-ventilated
with built-on brake



Special version
Type of cooling IC 411, self-ventilated
with built-on brake and incremental
encoder



Special version
Type of cooling IC 416, forced ventilation
with built-on brake and incremental
encoder



Special version
Type of cooling IC 410, non-ventilated
with built-on brake and incremental
encoder

Maintenance

Attention is drawn expressly to the safety notes and instructions, and here in particular to the procedures for safe isolation, safeguarding against accidental restarting, and checking the proper disconnection of all components connected to a voltage source. When a motor is disconnected from the mains supply for maintenance purposes, particular care must be taken to ensure that any auxiliary circuits, e. g. space heaters, forced ventilation fans or brakes, are similarly disconnected from their power supply. If it is necessary to dismantle the motor to perform maintenance work, the sealing compound left on the centring edges must be removed. New sealing compound of a suitable type is to be used for sealing when the motor is reassembled. Any copper sealing rings must always be refitted.

Careful and regular maintenance and inspection is imperative, so as to be able to detect and rectify any arising problems in good time before further damage is caused. As the operating conditions are not exactly defined, it is only possible to specify general maintenance intervals, under the assumption of trouble-free operation. These intervals must always be adapted in accordance with the local circumstances (contamination, loads, etc.).

What is to be done?	Regular interval	Max. interval
Initial inspection	After approx. 500 operating hours	At the latest after six months
Check of air passages and motor surface	Depending on types of local contamination	
Relubrication (option)	See rating plate or lubrication plate	
Main inspection	Approx. 8000 operating hours	Once a year
Drain condensation	Depending on climatic conditions	

Inspections

Initial inspection

In accordance with the specifications, an initial inspection of the motor should be performed after approx. 500 operating hours, but at the latest after six months.

The following checks are to be performed with the motor at standstill:

a) Check the foundation. There must be no cracks or other damage such as depressions or the like.

The following checks are to be performed with the motor running:

a) Check the electrical parameters.
b) Check the bearing temperatures. It is to be determined whether the permissible bearing temperatures are exceeded during operation of the motor.
c) Check for unusual noises during operation. An acoustic check is performed to determine whether the quiet running of the motor has deteriorated.

If the checks reveal any deviations from the values specified in the operating and maintenance manual, or any other defects or errors, these deviations and defects must be rectified immediately.

Main inspection

In accordance with the specifications, a main inspection should be performed once a year or after approx. 10,000 operating hours.

The following checks are to be performed with the motor at standstill:

a) Check the foundation. There must be no cracks or other damage such as depressions or the like.
b) Check the alignment of the motor. The alignment must lie within the specified tolerances.
c) Check the mounting screws and bolts. All screws and bolts which are used to make mechanical and electrical joints and connections must be properly tight (see also the table of tightening torques for screws and bolts under Section 11 “Commissioning” of the operating and maintenance manual).
d) Check the cables and the insulation materials. It is to be checked whether the cables and the insulation materials used are in a good and proper condition. They must not display discolouration, and in particular not burn marks, and must not be broken, cracked or otherwise damaged.
e) Check the insulation resistance. When checking the insulation resistance of the winding, observe the specifications given in the operating and maintenance manual (Section 9).
f) Depending on the grease quality and the bearings of the motor, it may also be necessary to replace the grease of the anti-friction bearings after 10,000 operating hours (see also Section 13 “Bearings and lubrication” of the operating and maintenance manual). Otherwise, the specified relubrication intervals for the anti-friction bearings must be observed separately, as they deviate from the inspection intervals.

The following checks are to be performed with the motor running:

a) Check the electrical parameters.
b) Check the bearing temperatures. It is to be determined whether the permissible bearing temperatures are exceeded during operation of the motor.
c) Check for unusual noises during operation. An acoustic check is performed to determine whether the quiet running of the motor has deteriorated.

If the checks reveal any deviations from the values specified in the operating and maintenance manual, or any other defects or errors, these deviations and defects must be rectified immediately.

Long-term storage (over 12 months)

If long-term storage is necessary, motors must be protected from vibration and kept in closed, dry rooms at temperatures between -20 and +40 °C and in an atmosphere free from aggressive gases, vapours, dusts and salts. Motors should preferably be transported and stored in their original packaging. Storage and transport resting on the fan cowl is not permissible. Unprotected metal surfaces, for example shaft ends and flanges, are to be provided with long-term corrosion protection, in addition to the temporary corrosion protection applied before motors leave the factory.

If the motors are subject to condensation under the given ambient conditions, precautions are to be taken to protect the motors against moisture. In such cases, the motors must be specially packed in air-tight welded foil or under plastic foil with appropriate desiccants. Desiccant sachets are also to be placed in the motor terminal boxes.

For transport, the ring bolts/load beams of the motors are to be used together with appropriate lifting tackle. The ring bolts/load beams are only intended for lifting of the bare motor without additional built-on parts such as base plate, gearing, etc.

Motors with reinforced bearings are supplied with a transport brace. The transport brace on the shaft end should only be removed after assembly of the motor and prior to the first starting.

Disposal

The applicable national regulations are to be observed with regard to disposal of the machines.

It is furthermore to be ensured that oils and greases are collected for disposal in accordance with the corresponding regulations on waste oils. They must not be contaminated with solvents, cold cleaners and paint residues.
The individual materials should be segregated for recycling. The most important components are grey cast iron (housing), steel (shaft, stator and rotor lamination, small parts), aluminium (rotor), copper (windings) and plastics (insulation materials, such as polyamide, polypropylene, etc.). Electronic components such as circuit boards (converter, sensors, etc.) are recycled separately.

Warranty, repairs, spare parts
Our authorised service workshops are responsible for all warranty repairs, unless expressly agreed otherwise. They can also be contacted in connection with any other repairs which may become necessary. Information on our customer service network can be requested from our central offices. An overview of the available spare parts is to be found in Chapter 15. Maintenance in accordance with the instructions given in the section “Maintenance” is not considered a breach of the warranty stipulations. It thus cannot be deemed to release the manufacturer from any agreed warranty obligations.

Fits: Shaft ends

Shaft ends	up to Ø 48	k6
	from Ø 55	m6
Mating parts		H7

Tolerances – Electrical parameters

According to DIN EN 60034-1, the following tolerances are permissible:

Efficiency (when determined indirectly)	-0,15 (1-η) at $P_N \leq 150$ kW -0,1 (1-η) at $P_N > 150$ kW
Power factor	$\frac{1-\cos\varphi}{6}$ min. 0,02 max. 0,07
Total losses (applicable for machines with rated outputs ≥ 150 kW)	+10 %
Slip (with nominal load and at operating temperature)	± 20 % at $P_N \geq 1$ kW ± 30 % at $P_N < 1$ kW
Starting current (with intended starting circuit)	+20 % no lower limit
Starting torque	-15 % and +25 %
Pull-up torque	-15 %
Breakdown torque	-10 % (M_K/M_N still at least 1.6 after application of this tolerance)
Moment of inertia	±10 %
Noise level (sound pressure level at measuring surface)	+ 3 dB (A)

These tolerances are applicable to the warranted values for three-phase asynchronous motors, taking into account necessary manufacturing tolerances and possible deviations in the raw materials used. The standard includes the following notes:

1. It is not intended that warranties necessarily have to be given for all or any of the items involved. Quotations including warranted values subject to tolerances should say so, and the tolerances should be in accordance with the table.
2. Attention is drawn to variations in the interpretations of the terms “warranty” and “guarantee”. In some countries, a distinction is made between declared and typical values.
3. Where a tolerance is stated in only one direction, the value is not limited in the other direction.

Tolerances – Mechanical parameters

Dimension symbol to DIN EN 50347	Meaning of dimension	Fit or tolerance
B [a]	Spacing of fixing holes for housing feet in axial direction	±1 mm
P [a_1]	Diameter or width across corners of flange	-1 mm
A [b]	Spacing of fixing holes for housing feet transverse to axial direction	±1 mm
N [b_1]	Diameter of centring edge of mounting flange	up to diameter 230 mm j6 from diameter 250 mm h6
D, DA [d, d_1]	Diameter of cylindrical shaft end	up to diameter 48 mm k6 from diameter 55 mm m6
M [e_1]	Pitch circle diameter of mounting flange	±0,8 mm
AB [f], AC [g]	Greatest width of motor (without terminal box)	+2 %
H [h]	Shaft height (bottom edge of foot to centre of shaft end)	up to 25 –0,5 mm over 250 –1 mm
L, LC [k, k_1]	Total motor length	+1 %
HD [p]	Total motor height (bottom edge of foot, housing or flange to highest point of motor)	+2 %
K, K' [s, s_1]	Diameter of mounting holes of foot or flange	+3 %
GA, GC [t, t_1]	Bottom edge shaft end to top edge key	+0,2 mm
F, FA [u, u_1]	Width of key	h9
C, CA [w_1, w_2]	Distance from centre of first foot mounting hole to shaft shoulder or flange face Distance from shaft shoulder to flange face with fixed bearing at D-end Distance from shaft shoulder to flange face	±3,0 mm ±0,5 mm ±3,0 mm
m	Motor mass	-5 to +10 %

Noise values, Sound pressure level L_{pA}

for motors IE3-W41R, IE3-W42R in normal version

IE3- 2-pole	L_{pA} dB	IE3- 4-pole	L_{pA} dB	IE3- 6-pole	L_{pA} dB	IE3- 8-pole	L_{pA} dB
W41R 56 G 2	46						
W42R 63 K 2	46	W42R 63 K 4		W41R 63 G 6	38		
W41R 63 K 2	48	W41R 63 G 4	40				
W41R 63 G 2	48						
W42R 71 K 2	50	W42R 71 K 4	46	W42R 71 K 6	42	W41R 71 G 8	38
W41R 71 K 2	53	W41R 71 K 4	46	W41R 71 K 6	42		
W41R 71 GY 2	53	W41R 71 GY 4	46	W41R 71 GY 6	42		
W41R 71 G 2	53	W41R 71 G 4	46	W41R 71 G 6	42		
W42R 80 K 2	53	W41R 80 K 4	50	W41R 80 K 6	46	W42R 80 K 8	46
W41R 80 K 2	55	W41R 80 G 4	50	W41R 80 G 6	46	W41R 80 G 8	46
W41R 80 GY 2	55	W41R 80 GX 4	50				
WE1R 80 G 2	55						
W42R 90 S 2	58	W41R 90 SY 4	54	W41R 90 SY 6	51	W42R 90 SY 8	50
W41R 90 S 2	60	W41R 90 S 4	54	W41R 90 S 6	51	W41R 90 S 8	50
W41R 90 LY 2	60	W41R 90 L 4	54	W41R 90 L 6	51	W41R 90 L 8	50
W41R 90 L 2	60	W41R 90 LX 4	54				
W42R 100 LY 2	63	W41R 100 LY 4	58	W41R 100 LX 6	52	W41R 100 LY8	52
W41R 100 L 2	63	W41R 100 L 4	58			W21R 100 L 8	52
		W41R 100 LW 4	58			W21R 100 LW 8	52
		W41R 100 L 4	58			W21R 100 LX 8	52
		W41R 100 LZ 4	58				
W41R 112 MY 2	67	W41R 112 MW4	60	W41R 112 MV 6	56	W21R 112 M 8	56
W41R 112 M 2	67	W41R 112 M 4	60	W41R 112 MZ 6	56	W41R 112 MZ 8	56
W40R 112 M 2	67						
W41R 112 MX 2	67						
W41R 132 S 2T	70			W41R 132 S 6	58	W41R 132 S 8	65
W41R 132 S 2	70						
		W41R 112 M4	58	W41R 112 M6	55		
		W41R 132 S4	56	W41R 132 S6	55	W41R 132 S8	56
W41R 132 SX2	66						
		W41R 132 M4	56	W41R 132 M6	55	W41R 132 M8	56
		W41R 132 MX4	-	W41R 132 MX6	56	W41R 132 MX8	-
W41R 160 M2	68	W41R 160 M4	61	W41R 160 M6	56	W41R 160 M8	58
W41R 160 MX2	68					W41R 160 MX8	58
W41R 160 L2	68	W41R 160 L4	61	W41R 160 L6	57	W41R 160 L8	62
W41R 180 M2	72	W41R 180 M4	62				
		W41R 180 L4	62	W41R 180 L6	61	W41R 180 L8	58
W41R 200 L2	74	W41R 200 L4	66	W41R 200 L6	63	W41R 200 L8	59
W41R 200 LX2	74	W41R 200 LX4	-	W41R 200 LX6	63		
		W41R 225 S4	66			W41R 225 S8	60
W41R 225 M2	72	W41R 225 M4	66	W41R 225 M6	64	W41R 225 M8	58
W41R 250 M2	74	W41R 250 M4	65	W41R 250 M6	65	W41R 250 M8	59
W41R 280 S2	74	W41R 280 S4	65	W41R 280 S6	73	W41R 280 S8	63
W41R 280 M2	74	W41R 280 M4	68	W41R 280 M6	73	W41R 280 M8	63
W41R 315 S2	75	W41R 315 S4	68	W41R 315 S6	71	W41R 315 S8	65
W41R 315 M2	75	W41R 315 M4	68	W41R 315 M6	71	W41R 315 M8	74
W41R 315 MX2	76	W41R 315 MX4	70	W41R 315 MX6	72	W41R 315 MX8	74
W41R 315 MY2	76	W41R 315 MY4	70			W41R 315 MY8	74
W41R 315 L2	76	W41R 315 L4	76	W41R 315 L6	72	W41R 315 L8	74
W41R 315 LX2	76	W41R 315 LX4	76				
		W41R 355 MY4	78			W41R 355 MY8	72
W41R 355 M2G	77 [1)]	W41R 355 M4	78	W41R 355 M6	72	W41R 355 M8	72
W42R 355 MX2G	77 [1)]	W42R 355 MX4	78	W42R 355 MX6	72	W42R 355 MX8	72
W42R 355 L2G	77 [1)]	W42R 355 L4	78	W42R 355 L6	72	W42R 355 L8	72
W42R 355 LX2G	77 [1)]	W42R 355 LX4	78	W42R 355 LX6	72		
				W42R 400 MY6	78		
W42R 400 M2G	79 [1)]	W42R 400 M4	78	W42R 400 M6	78	W42R 400 M	***)
W42R 400 MX2G	79 [1)]	W42R 400 MX4	78	W42R 400 MX6	78	W42R 400 MX	***)
W42R 400 L 2G	79 [1)]	W42R 400 L 4	78	W42R 400 L 6	78		

[1)] With axial fan, direction-dependent version

The noise values specified in the tables refer to operation at rated output, rated voltage and 50 Hz, with a tolerance of +3 dB.

Noise measurements in accordance with DIN EN ISO 1680

***) upon request

Noise values, Sound pressure level L_{pA}

for motors IE2-W..R in normal version

IE2-	L_{pA} dB	IE2-	L_{pA} dB	IE2-	L_{pA} dB	IE-	L_{pA} dB
2-pole		4-pole		6-pole		8-pole	
WE2R 56 G 2	46						
W21R 56 G 2	46						
WE2R 63 K 2	46	WE2R 63 K 4	40				
W21R 63 K 2	48	W21R 63 K 4	40				
WE2R 63 G 2	46	WE1R 63 GY 4	40				
W21R 63 G 2	48	W21R 63 G 4	40	WE2R 63 G 6	38		
WE2R 71 K 2	50	WE2R 71 K 4	46	WE2R 71 K 6	42		
W21R 71 K 2	53	W21R 71 K 4	46	W21R 71 K 6	42		
WE2R 71 G 2	50	WE1R 71 GY 4	46	WE2R 71 G 6	42	WE2R 71 G 8	38
W21R 71 G 2	53	W21R 71 G 4	46	W21R 71 G 6	42		
WE2R 80 K 2	53	WE2R 80 K 4	50	WE2R 80 K 6	46	WE2R 80 K 8	46
W21R 80 K 2	55	W21R 80 K 4	50	W21R 80 K 6	46		
WE2R 80 G 2	53	WE1R 80 GY 4	50	WE1R 80 GY 6	46		
W41R 80 G 2	55	W21R 80 G 4	50	W21R 80 G 6	46	WE2R 80 G 8	46
WE2R 90 S 2	58	WE2R 90 S 4	54	WE2R 90 S 6	51	WE2R 90 S 8	50
W21R 90 S 2	60	WE1R 90 S 4	54	W21R 90 S 6	51	W21R 90 S 8	50
WE2R 90 L 2	58	WE1R 90 LW 4	54	WE1R 90 LW 6	51	WE2R 90 L 8	50
WE1R 90 L 2	60	WE1R 90 L 4	54	W21R 90 L 6	51	W21R 90 L 8	50
WE2R 100 LY 2		W21R 100 S 4	58	WE2R 100 LW 6	52	WE2R 100 L 8	52
WE1R 100 L 2	63	WE1R 100 L 4	58	W21R 100 LX 6	62	W21R 100 L 8	52
		WE1R 100 LW 4	58	W21R 100 LV 6	55	WE2R 100 LY 8	52
		WE1R 100 LX 4	58			W21R 100 LX 8	52
WE1R 112 M 2	64	WE1R 112 MZ 4	60	WE1R 112 MX 6	54	WE2R 112 M 8	56
WE1R 112 MX 2	64	WE2R 112 M 4	60	W21R 112 MV 6	54	W21R 112 MV 8	56
WE1R 112 ML 2	64	WE1R 112 MW4	60	WE1R 112 MZ 6	54		
WE1R 112 MV 2	64	WE1R 112 MX 4	60	WE1R 112 M 6	54		
WE1R 112 MW 2	70						
WE1R 132 SY 2T	66	WE2R 132 SY 4	63	WE1R 132 SX6T	54		
WE1R 132 S 2T	66	WE2R 132 S 4	63	W21R 132 S 6	54	W21R 132 S 8	65
WE2R 132 S 2	66			WE2R 132 M 6	54	WE2R 132 M 8	65
WE1R 132 S 2T	70						
WE1R 132 SX2	66	WE1R 132 S4	58	WE1R 132 S6	55	WE1R 132 S8	57
		WE2R 132 S4	57	WE1R 132 M6	55	WE1R 132 M8	59
		WE1R 132 M4	58	WE2R 132 M6	55	WE2R 132 M8	57
				WE1R 132 MX6	56		
WE1R 160 M2	67	WE1R 160 M4	62	WE1R 160 M6	55	WE1R 160 M8	58
WE1R 160 MX2	67	WE2R 160 M4	57	WE2R 160 M6	55	WE1R 160 MX8	58
WE1R 160 L2	67	WE1R 160 L4	62	WE1R 160 L6	57	WE2R 160 MX8	58
		WE2R 160 L4	61	WE2R 160 L6	62	WE1R 160 L8	58
WE1R 180 M2	72	WE1R 180 M4	63	WE1R 180 L6	62	WE1R 180 L8	58
		WE2R 180 M4	63	WE2R 180 L6	57	WE2R 180 L8	58
		WE1R 180 L4	63				
WE1R 200 L2	72	WE1R 200 L4	66	WE1R 200 L6	62	WE1R 200 L8	58
WE2R 200 LX2	72			WE1R 200 LX6	64		
				WE2R 200 LX6	62		
WE1R 225 M2	74	WE1R 225 S4	67	WE1R 225 M6	64	WE1R 225 S8	60
		WE1R 225 M4	67	WE2R 225 M6	65	WE2R 225 S8	59
		WE2R 225 M4	67			WE1R 225 M8	59
						WE2R 225 M8	61
WE1R 250 M2	74	WE1R 250 M4	68	WE1R 250 M6	65	WE1R 250 M8	61
		WE2R 250 M4	67	WE2R 250 M6	65	WE2R 250 M8	58
WE1R 280 S2	75	WE1R 280 S4	70	WE1R 280 S6	65	WE1R 280 S8	61
WE1R 280 M2	75	WE1R 280 M4	70	WE1R 280 M6	73	WE1R 280 M8	65
WE1R 315 S2	78	WE1R 315 S4	71	WE1R 315 S6	73	WE1R 315 S8	65
WE1R 315 M2	78	WE1R 315 M4	71	WE1R 315 M6	73	WE1R 315 M8	65
WE1R 315 MX2	78	WE1R 315 MX4	71	WE1R 315 MX6	71	WE1R 315 MX8	74
WE1R 315 MY2	79	WE1R 315 MY4	76	WE1R 315 MY6	71	WE1R 315 MY8	74
WE1R 315 L2	79	WE1R 315 L4	76	WE1R 315 L6	71	WE1R 315 L8	74
WE1R 315 LX2	79	WE1R 315 LX4	76	WE1R 315 LX6	71	WE1R 315 LX8	74
WE2R 355 M2G	77 [1]	WE2R 355 M4	78	WE2R 355M6	72	WE2R 355M8	72
WE2R 355 MX2G	77 [1]	WE2R 355 MX4	78	WE2R 355MX6	72	WE2R 355MX8	72
WE2R 355 LY2G	77 [1]	WE2R 355 LY4	78	WE2R 355LY6	72	WE2R 355LY8	72
WE2R 355 L2G	77 [1]	WE2R 355L4	78				

[1] With axial fan, direction-dependent version

The noise values specified in the tables refer to operation at rated output, rated voltage and 50 Hz, with a tolerance of +3 dB.

Noise measurements in accordance with DIN EN ISO 1680

Noise values, Sound pressure level L_{pA}

for motors (IE1-)K21R, (IE1-)KU1R, (IE1-)K22R in normal version

	L_{pA} dB	L_{pA} dB	L_{pA} dB	L_{pA} dB
	2-pole	4-pole	6-pole	8-pole
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 [2]	77 [1]	77	70	68
355 LY, L [2]	77 [1]	77	70	68

[1] With axial fan, direction-dependent version
[2] Series (IE1-)K22R

Low-noise version [1]

	L_{pA} dB
	2-pole
200 LX	65
225 S	-
225 M	65
250 M	65
280 S	66
280 M	66
315 S	68
315 M	68
315 MX	68
315 MY	68
315 L	70
315 LX	68

The noise values specified in the tables refer to operation at rated output, rated voltage and 50 Hz, with a tolerance of +3 dB.
Noise measurements in accordance with DIN EN ISO 1680

Noise values, Sound pressure level L_{pA}

for motors (IE1-)K20R, (IE1-)KU0R in normal version

	L_{pA} dB	L_{pA} dB	L_{pA} dB	L_{pA} dB
	2-pole	4-pole	6-pole	8-pole
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

The noise values specified in the tables refer to operation at rated output, rated voltage and 50 Hz, with a tolerance of +3 dB.
Noise measurements in accordance with DIN EN ISO 1680

Explanations of modifications

Electrical/winding monitoring

Code	Modification	Description
101	Other voltage and/or frequency/special winding	Version for voltages or frequencies other than those specified by IEC/DIN or for special windings according to customer's request
102	Multi-voltage type (12 terminals)	Version for a multi-voltage motor in ratio 1:2 withΔ ΔΔ/Δ circuit
335	Multi-voltage type 1:2 (9 terminals)	Version for a multi-voltage motor in ratio 1:2 with YY/Y circuit
103	1 x PT 100 (winding protection) four-wire circuit	One PT 100 temperature sensor of four-wire circuit type in the winding overhang of the drive side for protection of the winding
130	1 x PT 100 (winding protection) two-wire circuit	One PT 100 temperature sensor of two-wire circuit type in the winding overhang of the drive side for protection of the winding
379	1 x PT 100 (winding protection) two-wire circuit for converter-fed operation > 420 V (KU, KV, BM)	One PT 100 temperature sensor of two-wire circuit type in the winding overhang of the drive side for protection of the winding, suitable for converter-fed operation at voltages > 420 V
391	3 x PT 100 (winding protection) four-wire circuit	Three PT 100 temperature sensors of four-wire circuit type in each phase for the protection of the winding
392	3 x PT 100 (winding protection) two-wire circuit	Three PT 100 temperature sensors of two-wire circuit type in each phase for the protection of the winding
393	3 x PT 100 (winding protection) two-wire circuit for converter-fed operation > 420 V (KU, KV, BM)	Three PT 100 temperature sensors of two-wire circuit type in each phase for the protection of the winding, suitable for converter-fed operation at voltages > 420 V
480	1 x PT 1000 (winding protection) two-wire circuit	One PT 1000 temperature sensor of two-wire circuit type in the winding overhang of the drive side for protection of the winding
105	Y/Δ start for one speed (9 terminals)	Modification for pole-changing motors with two windings
106	Y/Δ start for two speeds (12 terminals)	Modification for pole-changing motors with two windings
128	3 PTC resistors	Three PTC resistor temperature sensors (PTC positive temperature coefficient), temperature-dependent semiconductor resistors with positive temperature coefficient, 1 sensor installed in each phase
371	3 PTC resistors for converter-fed operation > 420 V (KU, KV, BM)	as above, but special version for increased voltage loads in converter-fed operation
129	6 PTC resistors	Six PTC resistor temperature sensors, temperature-dependent semiconductor resistors with positive temperature coefficient, 1 sensor installed in each phase on each side of the motor
372	6 PTC resistors for converter-fed operation > 420 V (KU, KV, BM)	as above, but special version for increased voltage loads in converter-fed operation
87	Temperature sensor KTY 84-130 (1 pc.)	One temperature sensor on a semiconductor basis in the winding overhang of the drive side for protection of the winding
377	Temperature sensor KTY 84-130 (1 pc.) for converter-fed operation > 420 V (KU, KV, BM)	One temperature sensor on a semiconductor basis in the winding overhang of the drive side for protection of the winding, suitable for increased voltage loads in converter-fed operation
131	3 microtherm switches	One triple set of microtherm switches in the winding overhang of the drive side for protection of the winding
378	3 microtherm switches for converter-fed operation > 420 V (KU, KV, BM)	One triple set of microtherm switches in the winding overhang of the drive side for protection of the winding, suitable for increased voltage loads in converter-fed operation
388	6 microtherm switches	Two triple sets of microtherm switches in the winding overhang of the drive side for protection of the winding
389	6 microtherm switches for converter-fed operation > 420 V (KU, KV, BM)	Two triple sets of microtherm switches in the winding overhang of the drive side for protection of the winding, suitable for increased voltage loads in converter-fed operation

Note: Explanations of footnotes see page 1/56.

Code	Modification	Description
139	Anti-condensation heating/heating tape (110 V or 220 V, 50 Hz)	Version with anti-condensation heating or a heating tape for standard applications
336	Anti-condensation heating tape Ex 2G/2D (110V/220V)	Version with anti-condensation heating or a heating tape for explosion-protected motors
171	Thermal class 180 [H/F] (old: class H utilised to F)	Version in thermal class 180 with an insulation that is utilised to maximum TC 155
185	Thermal class 180 (old: class H)	Version in thermal class H according to F with insulation optimised for operation at increased temperatures
261	Version for voltages up to 1,000 V (mains operation)	Version for a motor operation on mains voltages > 725 V up to 1,000 V
444	K21R 56–132 T with special designation SP.2945	Version for converter-fed operation with max. load Ü ≤ 1,350 V und du/dt ≤ 1 kV/µs
426	Converter-fed operation without filter up to 500 V	Version for converter-fed operation up to 500 V (curve A to EC TS 60034-26), so-called KU version with special insulation
366	Converter-fed operation without filter up to 690 V	Version for converter-fed operation up to 690 V (curve B to EC TS 60034-26), so-called KV version with special insulation
164	Generator version	Version for generator operation with a winding specially modified for this mode of operation
363	Auxiliary traction motor for converter operation (BMU)	Version for use as auxiliary traction motor (see below) for converter-fed operation
77	Auxiliary traction motor (BM) (incorporates TII and vibration-resistant design)	Version for use as auxiliary traction motor with the modifications TII and vibration-resistant design, as well as with special terminal leads and two-fold impregnation of the winding

Terminal connections/cable entry

Code	Modification	Description
97	Terminal box, side-mounted (right, left) Terminal box, inclined type	Version with terminal box mounted on side of motor, either right or left
98	Terminal box, rotated (entry D-end/N-end/left)	Version with terminal box mounted on top of the motor housing but rotated relative to the shaft axis
156	Terminal lead length greater than 1,000 mm (with 6 conductors each: for each 500 mm or part thereof) (for built-in motors only)	Supplement for terminal lead cable lengths exceeding 1,000 mm or, in the case of versions with six conductors, for each 500 mm or part thereof; applies to built-in motors only
158	Without terminal box, with cover plate	Version of motor without terminal box but with a cover plate fitted instead; the cable price is charged separately
159	Without terminal box, with cover box	Version of motor without terminal box but with a cover box fitted instead; the cable price is charged separately
337	Without terminal box, with cover box/flat connectors up to 1 m cable	Version of motor without terminal box but with a cover box fitted instead and additional flat connectors for the cables; the cable price is charged separately
187	Next larger terminal box	Version with the next larger terminal box fitted by customer request
188	Additional terminal box (without accessories)	Additional terminal box which is supplied without any accessories
196	Terminal box for auxiliary connections	Additional terminal box in which the auxiliary connections are accommodated
279	Terminal box in grey cast iron, 25/63 A	Terminal box made of grey cast iron with a standard connection face but larger cable cross-sections, suitable for 25 A or 63 A
289	VIK terminal box	Terminal box complying with the requirements of VIK Recommendation 1, Three-Phase Asynchronous Motors, Technical Requirements, 04.2005
302	1,000 A terminal box[1)]	Terminal box whose terminal board is suitable for a 1,000 A connection (busbars)
310	630 A terminal box[2)]	Terminal box whose terminal board is suitable for a 630 A connection
168	Housing rotated in longitudinal direction	Y version, connections are located on fan side

Code	Modification	Description
357	Terminal box, N-end	Terminal box on N-end shield
441	IP 56 terminal box	Terminal box version in IP 56 to IEC/EN 60034-5 (EN 60529), IP 5x ... Protected against dust in harmful amounts, full protection against contact, IP x6 ... Protection against strong water jets
442	IP 65 terminal box	Terminal box version in IP 65 to IEC/EN 60034-5 (EN 60529), IP 6x ... Dust-tight, full protection against contact, IP x5 ... Protection against water jets (nozzle) from any angle
469	IP 66 terminal box	Terminal box version in IP 65 to IEC/EN 60034-5 (EN 60529), IP 6x ... Dust-tight, full protection against contact, IP x5 ... Protection against strong water jets

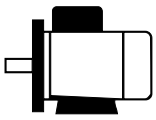
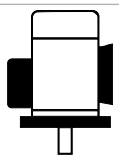
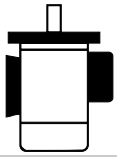
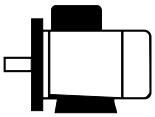
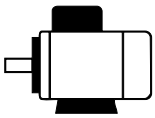
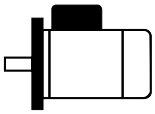
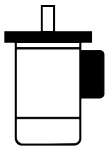
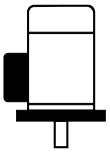
Types of protection/standards and regulations

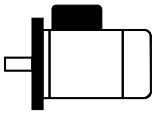
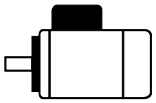
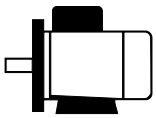
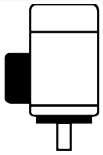
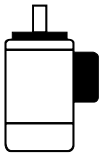
Code	Modification	Description
144	VEM power station design according to EW-N 8269 (KA)	Version with flexible terminal leads, climate-resistant rotor, terminal box dimensions according to VIK specifications, metallic cable glands and paint finish 02
314	VIK version	Version according to VIK Recommendation 1, Three-Phase Asynchronous Motors, Technical Requirements 03.2011
470	VIK Ex version	Version for explosion-protected motors according to VIK Recommendation 1, Three-Phase Asynchronous Motors, Technical Requirements 03.2011
374	Degree of protection IP 54	Degree of protection according to IEC/EN 60034-5: IP5x dust-proof, IPx4 splash water
125	Degree of protection IP 56	Degree of protection according to IEC/EN 60034-5: IP5x dust-proof, IPx6 strong water jets
85	Degree of protection IP 57 S	Degree of protection according to IEC/EN 60034-5: IP5x dust-proof, IPx7 S temporary immersion at standstill
170	Degree of protection IP 65	Degree of protection according to IEC/EN 60034-5: IP6x dust-tight, IPx5 water jets
169	Degree of protection IP 66	Degree of protection according to IEC/EN 60034-5: IP6x dust-tight, IPx6 strong water jets
137	Marine version IP 55	Marine version for below-deck operation, degree of protection IP 55, according to classification society ...
138	Marine version IP 56	Marine version for on-deck operation, degree of protection IP 56, according to classification society ...
307	Special marine version according to EW-N 8278 (mechanical)	Marine version according to works standard, without direct classification reference
361	Vertical design (marine version)	Special bearing concept with Q bearings for vertical types used in marine applications
382	Combined approval for USA, Canada (cULus)	Version meeting both the US regulations (UL 1004) and Canadian regulations (CSA C22.2.100)
387	Approval for USA (UL)	Version meeting the US regulations (UL 1004)
192	CSA version	Version meeting the Canadian regulations
194	NEMA version (electrical)	Version which meets the US regulations (NEMA-MG 1) with respect to the electrical properties
197	Rheinbraun standard EM 2.2	Version according to RB standard EM 2 (edition 04/99, Annex 1 of 04/99), EW-N 8231
252	Kali + Salz (E 5.09)	Version according to design standard E 5.09 of Kali + Salz AG, EW-N 8298
353	Version for port cranes according to EW-N 8233	Version according to EW-N 8233 with brake, cable entry on the right, welded fan cowl, climate-resistant rotor, special terminal board, two-fold impregnation (Joule heat and vacuum), paint system 04
191	Shell version (SH)	Version according to regulation DEP 33.66.05.31-Gen (edition February 2012), EW-N 8272
459	VEMoCHEM (VC)	Motor in chemical industry design, EW-N 8238 (includes VIK version)
471	Low-temperature version -45 °C, without shaft seals	Version in materials suitable for low temperatures to -45 °C, EW-N 8245

Note: Explanations of footnotes see page 1/56.

Code	Modification	Description
472	Low-temperature version -50 °C, without shaft seals	Version in materials suitable for low temperatures to -50 °C, EW-N 8245
473	Low-temperature version -60 °C, without shaft seals	Version in materials suitable for low temperatures to -60 °C, EW-N 8245

Types of construction

Code	Modification	Description
110	Without centring flange	Centring flange according to DIN EN 50347 not provided
375	Deviating flange according to catalogue	Flange assignment deviating from catalogue and DIN EN 50347
111	Version with welded feet (steel feet)	Steel feet instead of grey cast iron for the types IM B6, IM B7, IM B8, IM V5[4)], IM V6[4)]
369	Vertical version with Q bearings (required from 315 MY)	Special bearings to take up high axial forces; alternatively, a double bearing with two angular ball bearings may be used
112	IM B35	 Foot/flange design according to Code I, IEC/EN 60034-7, flange with through-holes [FF]
476	IM V15	 Foot/flange design according to Code I, IEC/EN 60034-7, flange with through-holes [FF], shaft end pointing down
476	IM V36	 Foot/flange design according to Code I, IEC/EN 60034-7, flange with through-holes [FF], shaft end pointing up
339	IM B35 K	 Foot/flange design according to Code I, IEC/EN 60034-7, smaller FF flange deviating from DIN EN 50347
113	IM B34	 Foot/flange design according to Code I, IEC/EN 60034-7, flange with threaded holes [FT]
114	IM B5	 Flange design according to Code I, IEC/EN 60034-7, flange with through-holes [FF]
362	IM V3	 Flange design according to Code I, IEC/EN 60034-7, flange with through-holes [FF], shaft end pointing down
356	IM V1	 Flange design according to Code I, IEC/EN 60034-7, flange with through-holes [FF], shaft end pointing up
117	Fan cowl with protective canopy	Version designed to prevent foreign objects falling into the fan of vertically mounted motors. The fan cowl is provided with a protective canopy larger in size than the circle of the air inlet openings.

Code	Modification	Description
338	IM B5 K	 Flange design according to Code I, IEC/EN 60034-7, smaller FF flange deviating from DIN EN 50347
115	IM B14, IM V18, IM V19	 Flange design according to Code I, IEC/EN 60034-7, flange with threaded holes [FT]
142	IM 2202 (IM B17, 2nd shaft end included)	 Flange on D- and N-ends of the motor; N-end flange designed as cast iron fan cowl
352	Type B5 / furnace flange (standard dimension)/ aluminium fan	Special flange for furnace ventilation with integrated cooling wheel
288	PAD-mounted 8 foot holes under 45 deg	Motor without feet, mounted by way of threaded rods, threaded holes under 45 deg
475	IM V18	 Flange design according to Code I, IEC/EN 60034-7, flange with threaded holes [FT], shaft end pointing down
475	IM V19	 Flange design according to Code I, IEC/EN 60034-7, flange with threaded holes [FT], shaft end pointing up
481	Sheet-steel fan cowl	Sheet-steel fan cowl
330	Plastic fan cowl	Plastic fan cowl
428	Flange ring K21R, P(a1)=660/800	Flange assignment deviating from DIN, FF740 instead of FF600
429	Steel flange K22R 355, P(a1)=1000 mm	Flange in welded steel version, FF940

Note: Explanations of footnotes see page 1/56.

Mechanical modifications

Code	Modification	Description
107	Special shaft	Shorter, thicker or thinner shaft, deviating from catalogue, 2nd shaft end included
108	Special shaft, 1 tapered shaft end	Special shaft with tapered shaft end, taper 1:10
427	Special shaft, 2 tapered shaft ends	Special shaft with two tapered shaft ends, taper 1:10
109	High-resistance rotor (Si 10)	High-resistance rotor
419	Shaft certificate (3.2)	Shaft certificate (3.2), required by some classification societies
116	Aluminium fan	Special fan in cast light-metal construction (EN AC-AlSiCu1Mg according to DIN EN 1706, material number EN AC 45300)
190	Grey cast iron fan	Special fan in grey cast iron construction (EN GJL-200 according to DIN EN 156[1])
195	Multi-wing fan (low-noise version)	Special low-noise unidirectional fan
330	Plastic fan cowl	Fan cover made of PC moulding compound, MR-09 B5 according to DIN 7744
333	Protective cover for encoder	Cover for protection of the incremental encoder
383	Vibration intensity B	Version with reduced vibration velocity in accordance with EN 60034-14
165	Balancing against zero	Precision balancing according to EW-N 8204 with very low vibration velocity
166	High-speed version (HS)	Version for motors which are intended for the use at speeds higher than those resulting from frequencies 50/60 Hz (e. g. converter-fed operation) and thus specially balanced
376	Balancing with full key	Version in which balancing is carried out with a full key instead of a half key
143	Type of cooling IC 418, non-ventilated version (K21R/K11R-O) (FAN)	Version of the motor without own fan in the cooling air flow
146	External earthing terminal on housing	Version with an additional external earthing terminal mounted on the housing
445	Type of cooling IC 410	Non-ventilated motor without own fan
161	Construction plant version (incl. TII, vibration-resistant)	Motors are vibration-resistant [see 163] and fitted with dust-proof bearings. Motors are always manufactured in combination with climate protection TII
162	Version for the textile industry	Version with a special ventilation system which reduces the accumulation of fibrous materials carried along by the cooling air, as well as IP 55, thermal class F according to B and thermal winding protection
163	Vibration-resistant version	Motors can be used under sinusoidal vibrations with a vibration load up to 4g at a frequency of 20 to 60 Hz. The winding overhang is specially stabilised for the anticipated load. The terminal leads are of flexible type and the screwed joints are locked by suitable means
177	Flange accuracy R according to DIN 42955	Version with reduced concentricity and axial eccentricity tolerance R according to DIN 42955
199	Condensate drain plug	Screw plug for closing the condensate drain hole
201	Condensate drain holes with felt plug (2 pcs.)	Hole at the lowest point of the housing or end shield (depending on type of motor) for draining the condensate accumulating in the motor interior, closed with a felt plug
280	Additional foot holes at the top of the housing	Foot holes are provided additionally at the top of the motor housing
285	Fan cowl with screen cut out	Version in which the screen is cut out from the fan cowl
294	Housing with load bracket thread (2 pcs.)	Version with two load bracket threads
322	Special fan	Fan deviating from standard design
331	Foot contact face, milled	Version in which foot contact faces are milled on the housing
411	Housing with ring nut (lifting eye)	Version with a ring nut
386	CRFID transponder (memory version)	Version equipped with an RFID transponder
463	Memory version retrofit kit (RFID transponder)	Retrofit kit for an RFID transponder
474	Earthing ring for bearing insulated on both sides	Earthing ring to prevent bearing currents

Corrosion protection/paint finish

Code	Modification	Description
133	Special paint colour	Colour specified by the customer
452	Special paint colours which are not available as paint system 01 (incl. paint system 02)	Colour specified by the customer
135	Paint system 02;02S "Worldwide" (open air, humid interior), corrosion class C2-C3 to EN ISO 12944-2:1998	Two-component EP primer and water-based top coat, layer thickness ≥ 110 µm
354	Paint system 04 (marine/port climate)	Two-component EP ceramic-filled, layer thickness ≥ 150 µm
368	Paint system 06 (heat, humidity, open air), corrosion class C2-C3 to EN ISO 12944-2:1998	Two-component EP primer and top coat, layer thickness ≥ 110 µm
134	Paint system 07 (chemicals, heat, humidity, suitable for decontamination), corrosion class C3 to EN ISO 12944-2:1998	Double two-component EP primer and two-component EP top coat, layer thickness ≥ 150 µm
443	Paint system 09L "Offshore" (UV-resistant), corrosion class C3 to EN ISO 12944-2:1998	Two-component EP water-based primer and two-component EP-PUR top coat, layer thickness ≥ 210 µm
311	Paint system 09S "Offshore" (UV-resistant), corrosion class C4/5 to EN ISO 12944-2:1998	Two-component EP zinc-dust primer, and two-component EP intermediate coat (containing iron mica) and two-component EP-PUR top coat, layer thickness ≥ 240 µm
460	Paint system 10L "Offshore", explosion-protection version (greater than 200 µm)	General Ex version, layer thickness ≤ 200 µm; outdoor installation, UV-resistant, high corrosion protection, corrosion class C3-C4 medium to high to EN ISO 12944-2:1998
461	Paint system 10S "Offshore", explosion-protection version (greater than 200 µm)	General Ex version, layer thickness ≤ 200 µm; offshore applications, drilling rigs, further enhanced corrosion protection, UV resistant, corrosion class C4/C5 high to very high (industry, marine) to EN ISO 12944-2:1998
136	Protection against enhanced climatic demands (TII)	Version with climate-resistant rotor, clamping bolts and standard parts with protective coating, stainless steel rating plate, paint system 02
412	Climate-resistant rotor	Rotor with a protective coating, suitable for tropical climates
173	Layer thicknesses per increase by 30 µm	Supplement for paint layer thicknesses other than as specified for the VEM paint systems
200	External screws and bolts in stainless steel	All external screws and bolts made of stainless steel
286	Fan cowl or N-end bearing cover or N-end shield painted on inside	Supplement for an additional layer of anticorrosion protection on the fan cowl or N-end bearing cover or N-end shield
287	Fan spray-coated with epoxy resin varnish	Supplement for an epoxy resin varnish coating for the fan
351	Paint system acc. to special-drawing 3135	Paint system based on customer specifications and documented in special drawing 3135, usually with synthetic primer (30 µm) followed by paint coat as specified by the customer
315	Zinc-plated fan cowl	Supplement for zinc-plated fan cowl

Note: Explanations of footnotes see page 1/56.

Built-on components

Code	Modification	Description
96	Centric mounting of encoder (bell/intermediate flange, shaft end, coupling) (K21F, K21O)	Supplement for the centric mounting of an incremental encoder
99	Centric mounting by way of a flange end shield, N-end (IM 2202)	Supplement for the centric mounting of an incremental encoder by way of a flange end shield on the N-end
367	Centric mounting by way of combined mount	Supplement for motors of frame size 315 where an incremental encoder is to be mounted centrically
100	Mounting of tacho and incremental encoder (under fan cowl), plug-on version without equipment	Supplement for the mounting of tacho and incremental encoder under the fan cowl
418	Mounting for Harting connector/switch	Connector system from Harting, socket (without plug)/switch
150	Mounting for backstop (without lock)	Supplement for the mounting of a backstop
358	Brake mounting	Supplement for the mounting of a motor brake
479	External fan mounting	Supplement for the mounting of an external fan
465	Gearbox mounting	Supplement for the mounting of a gearbox

Bearings

Code	Modification	Description
95	Oil-tight design (radial shaft seal, N-end fixed bearing)	Supplement for oil-tight design with radial shaft seal and fixed bearing on N-end
118	Radial sealing ring, D-end (incl. N-end fixed bearing)	Supplement for fitting of a radial sealing ring on the D-end, including a fixed bearing on the N-end
119	Fixed bearing, D-end	Supplement for a fixed bearing on the D-end
390	Fixed bearing, D-end, play-free	Supplement for a play-free fixed bearing on the D-end
120	Fixed bearing, N-end	Supplement for a fixed bearing on the N-end
121	Angular ball bearing, D-end	Supplement for an angular ball bearing on the D-end
122	Increased transverse forces, D-end (fixed bearing at N-end included)	Supplement for a motor design taking into account increased transverse forces on the D-end, including a fixed bearing on the N-end
415	Insulated roller bearing	Supplement for the fitting of an insulated roller bearing
340	Reinforced bearing, D-end (fixed bearing series 42.. included)	Supplement for a reinforced bearing on the D-end, including a fixed bearing from series 42..
332	Labyrinth seal	Supplement for the fitting of a labyrinth seal
342	Bearing sealing with combined seal, D-end	Supplement for the fitting of a combined seal for sealing of the bearing on the D-end
151	Bearing monitoring with temperature sensor for each bearing point (D-end/N-end) (without additional terminal box)	Supplement for the fitting of a temperature sensor for bearing monitoring for each bearing point, without requiring an additional terminal box
153	Bearing monitoring with PT 100 (2 conductors) for each bearing point	Supplement for the fitting of a bearing temperature monitoring facility with one PT 100 in two-wire circuit design for each bearing point
154	Bearing monitoring with PT 100 (4 conductors) for each bearing point	Supplement for the fitting of a bearing temperature monitoring facility with one PT 100 in four-wire circuit design for each bearing point
193	Relubricating device[6) 8)]	Version with relubricating device
262	Insulated bearing, N-end	Fitting of an insulated bearing on the N-end
413	Insulated bearing, D-end	Fitting of an insulated bearing on the D-end
278	Flat lubricating nipple in stainless steel (for both ends)	Fitting of a flat lubricating nipple on the D- and N-ends
394	Tapered lubricating nipple (for both ends)	Fitting of a tapered lubricating nipple on the D- and N-ends
321	Tapered lubricating nipple of stainless steel (for both ends)	Fitting of a stainless steel tapered lubricating nipple on the D- and N-ends
283	Fixed SPM sensor with accessories (for each bearing point)	Fitting of a fixed SPM sensor with accessories for each bearing point
284	SPM prepared without nipple	Motor is prepared for the installation of an SPM sensor
152	SPM bearing monitoring with nipple (2 pieces)	Fitting of a bearing monitoring facility with SPM sensor
434	SPM bearing monitoring with stainless steel nipple (2 pieces)	Fitting of a bearing monitoring facility with SPM sensor

Code	Modification	Description
467	Fixed SPM sensor with accessories (for each bearing point)	Fitting of a bearing monitoring facility with SPM sensor
306	Bearing sealing with radial shaft seal 9RB	Supplement for bearing sealing with a radial shaft seal 9RB
323	Double bearing seal, D-end (2 radial shaft seals + grease chamber)[7)]	Supplement for a double bearing seal on the D-end, with 2 radial shaft seals and grease chamber
364	Axial shaft seal	Supplement for the fitting of an axial shaft seal
365	Gamma ring	Supplement for the fitting of a gamma ring
127	Special grease	Supplement for the use of a special grease

Miscellaneous

Code	Modification	Description
147	Second rating plate, loose	Supplement for provision of a second rating plate, enclosed as loose item
148	Customer rating plate	Supplement for the creation of a rating plate according to customer specifications
414	Position plate	Supplement for the mounting of a position plate
149	Stainless steel rating plate	Supplement for a stainless steel rating plate
253	Silicone-free design	Supplement for a motor design free of silicone
410	Handling costs for supplied items	Supplement to cover the costs of handling tools/equipment supplied by the customer
431	Coolant temperature ≥ 100 °C	Version for coolant temperatures ≥ 100 °C

Note: Explanations of footnotes see page 1/56.

Overview of modifications

Price-Code	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42. / Transnorm (IE1-)K20. (IE2-)WE0./W20. / Chapter	Standard motors 2	Pole-switching motors 2	Transnorm motors 3	Motors for converter-fed operation 4	Water-cooled motors 5	Slip-ring motors 6	Built-in motors 7	Fire-gas motors 8	Roller table motors, light-duty series 9	Roller table motors, ARB 9	Roller table motors, ARC 9	Roller table motors, DS.. 9	Type of protection "eb" - Increased safety 10	Type of protection "d/de" - Flameproof enclosure 10	Type of protection "ec" - Increased safety 10	Protection by enclosure "tb", Zone 21 10	Protection by enclosure "tc", Zone 22 10	Motors for marine operation 11	Permanent magnet synchronous motors 12	Asynchronous generators 13
Efficiency class acc. to IEC/EN 60034-30-1																					
	without classification	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
	Standard Efficiency IE1	•	-	-	•	-	-	•	•	•	-	-	-	•	-	-	-	-	•	-	-
	High Efficiency IE2	•	-	•	•	•	-	•	•	•	-	-	-	•	•	•	•	•	•	-	-
	Premium Efficiency IE3	•	-	•	•	•	-	•	•	•	-	-	-	•	•	•	•	•	•	-	-
	Super Premimium Efficiency IE4	•	-	•	-	•	-	-	-	-	-	-	-	•	-	•	•	•	-	•	-
Electrical/Winding monitoring																					
101	different voltage and/or frequency/special winding	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
102	voltage-changeable (12 terminals)	•	-	•	•	•	•	•	•	•	•	•	•	-	•	-	-	-	•	-	-
335	voltage-changeable 1:2 (9 terminals)	•	•	•	•	•	•	•	•	•	•	•	•	-	•	-	-	-	•	-	-
103	1 x PT 100 (winding protection) 4-wires-connection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
130	1 x PT 100 (winding protection) 2-wires-connection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
379	1 x PT 100 (winding protection) 2-wires-connection for converter feeding > 420 V (KU, KV, BM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
391	3 x PT 100 (winding protection) 4-wires-connection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
392	3 x PT 100 (winding protection) 2-wires-connection	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
393	3 x PT 100 (winding protection) 2-wires-connection for converter feeding > 420 V (KU, KV, BM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
480	1 x PT 1000 (winding protection) two-wire circuit	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
105	star/delta starting for 1 speed (9 terminals)	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
106	star/delta starting for 2 speeds (12 terminals)	-	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
128	3 PTC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
371	3 PTC for converter feeding > 420 V (KU, KV, BM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
129	6 PTC	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
372	6 PTC for converter feeding > 420 V (KU, KV, BM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
87	temperature sensor KTY 84-130 (1 pc.)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
377	temperature sensor KTY 84-130 (1 pc.) for converter feeding > 420 V (KU, KV, BM)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
131	3 Microtherm switches	•	•	•	•	•	•	•	•	•	•	•	•	-	•	-	•	•	•	•	•
378	3 Microtherm switches for converter feeding > 420 V (KU, KV, BM)	•	•	•	•	•	•	•	•	•	•	•	•	-	•	-	•	•	•	•	•
388	6 Microtherm switches	•	•	•	•	•	•	•	•	•	•	•	•	-	•	-	•	•	•	•	•
389	6 Microtherm switches for converter feeding > 420 V (KU, KV, BM)	•	•	•	•	•	•	•	•	•	•	•	•	-	•	-	•	•	•	•	•
139	anti-condensation heating/heating tape (110 V or 220 V, 50 Hz)	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-	•	•	•
336	anti-condensations heating Ex 2G/2D (110 V/220 V)	-	-	-	-	-	-	-	-	-	-	-	-	•	•	•	•	•	-	-	-
171	insulation class H (cold) (used acc. to F)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
185	insulation class H (hot), insulation class H	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-	•	•	•
261	insulation for voltages 1000 V (mains operation)	•	•	•	•	•	•	•	•	•	•	•	•	-	•	•	-	•	•	•	•
444	K21R 56 -132 T with special mark SP.2945, Ü ≤1.350 V and du/dt ≤1kV/mys	•	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
426	Inverter operation without filter up to 500 V, curve A acc. to IEC TS 60034-25	•	-	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•	•
366	Inverter operation without filter up to 690 V, curve B acc. to IEC TS 60034-26	•	•	•	•	•	•	•	•	•	•	•	•	-	•	•	•	•	•	•	•
293	insulation class F/B special sheet steel	•	•	•	•	•	•	•	•	•	•	•	•	-	-	-	-	-	•	•	•
164	version as a generator	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	•	•
363	auxiliary railway motor converter feeding (BMU)	•	•	-	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	-	-
77	auxiliary railway motor (BM) (include TII+vibration-proof version)	•	•	-	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	-	-

56	63	71	80	90	100	100 LX, 112	132 T	132	160	180	200	225	250	280	315 S-MX	315 MY	315 L, LX	355 MY, M	355 MX, LY, L	400	450	500	560	630	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42.	Price-Code
-	56	63	71	80	90	100		112	132	160	180	200	225	250	280	315 S-MX	315 L, LX	-	-	-					-	Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	
																										Efficiency class acc. to IEC/EN 60034-30-1	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	without classification	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	Standard Efficiency IE1	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	High Efficiency IE2	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	Premium Efficiency IE3	
-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	Super Premimium Efficiency IE4	
																										Electrical/Winding monitoring	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	different voltage and/or frequency/special winding	101
A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	voltage-changeable (12 terminals)	102
-	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	voltage-changeable 1:2 (9 terminals)	335
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1 x PT 100 (winding protection) 4-wires-connection	103
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1 x PT 100 (winding protection) 2-wires-connection	130
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1 x PT 100 (winding protection) 2-wires-connection for converter feeding > 420 V (KU, KV, BM)	379
A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3 x PT 100 (winding protection) 4-wires-connection	391
A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3 x PT 100 (winding protection) 2-wires-connection	392
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3 x PT 100 (winding protection) 2-wires-connection for converter feeding > 420 V (KU, KV, BM)	393
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1 x PT 1000 (winding protection) two-wire circuit	480
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	star/delta starting for 1 speed (9 terminals)	105
-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	star/delta starting for 2 speeds (12 terminals)	106
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3 PTC	128
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3 PTC for converter feeding > 420 V (KU, KV, BM)	371
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	6 PTC	129
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	6 PTC for converter feeding > 420 V (KU, KV, BM)	372
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	temperature sensor KTY 84-130 (1 pc.)	87
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	temperature sensor KTY 84-130 (1 pc.) for converter feeding > 420 V (KU, KV, BM)	377
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3 Microtherm switches	131
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3 Microtherm switches for converter feeding > 420 V (KU, KV, BM)	378
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	6 Microtherm switches	388
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	6 Microtherm switches for converter feeding > 420 V (KU, KV, BM)	389
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	anti-condensation heating/heating tape (110 V or 220 V, 50 Hz)	139
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	anti-condensations heating Ex 2G/2D (110 V/220 V)	336
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	insulation class H (cold) (used acc. to F)	171
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	insulation class H (hot), insulation class H	185
-	-	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	insulation for voltages 1000 V (mains operation)	261
X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	K21R 56 -132 T with special mark SP.2945, Ü ≤1.350 V and du/dt ≤1kV/mys	444
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Inverter operation without filter up to 500 V, curve A acc. to IEC TS 60034-25	426
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Inverter operation without filter up to 690 V, curve B acc. to IEC TS 60034-26	366
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	insulation class F/B special sheet steel	293
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	version as a generator	164
X	X	X	X	X	X	X	A	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	auxiliary railway motor converter feeding (BMU)	363
X	X	X	X	X	X	X	A	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	auxiliary railway motor (BM) (include TII+vibration-proof version)	77

Price-Code	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42. / Transnorm (IE1-)K20. (IE2-)WE0./W20. / Chapter	Standard motors 2	Pole-switching motors 2	Transnorm motors 3	Motors for converter-fed operation 4	Water-cooled motors 5	Slip-ring motors 6	Built-in motors 7	Fire-gas motors 8	Roller table motors, light-duty series 9	Roller table motors, ARB 9	Roller table motors, ARC 9	Roller table motors, DS.. 9	Type of protection "eb" - Increased safety 10	Type of protection "d/de" - Flameproof enclosure 10	Type of protection "ec" - Increased safety 10	Protection by enclosure "tb", Zone 21 10	Protection by enclosure "tc", Zone 22 10	Motors for marine operation 11	Permanent magnet synchronous motors 12	Asynchronous generators 13
Connection system/cable entry																					
97	terminal box right, left hand side	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
	terminal box sloping version	-	-	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
98	terminal box turned (gland towards D-/N-end/left-hand side)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
156	lead length larger than 1000 mm (for 6 wires, for each started-on 500 mm) (only for built-in motors)	•		•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
158	without terminal box, with cover plate (without cable price)	•	•	•	•	•	•	-	•	•	•	•	•	-	-	•	-	•	•	•	•
159	without terminal box, with cover box (without cable price)	•	•	•	•	•	•	-	•	•	•	•	•	-	-	•	-	•	•	•	•
337	without terminal box, with cover box/flat connection system for max. 1m cable	•	•	•	•	•	•	-	•	•	•	•	•	-	-	•	-	•	•	•	•
187	terminal box next larger size	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
188	additional terminal box (without accessories)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
196	terminal box for auxiliary contacts	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
279	terminal box grey cast-iron 25/63 A	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
279	VIK terminal box	•	•	-	•	-		-	•	•	•	•	-	•	•	•	•	•	•	•	•
289	1000 A terminal box	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
310	630 A terminal box	-	-	•	•	•	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•
302	housing rotated in longitudinal direction	-	-	•	•	•	-	-	•	•	•	•	•	•	•	•	•	•	•	•	•
168	terminal box N-end	•	•	-	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
357	KK N-Seite	•	•	•	•	•	•	-	•	•	•	•	•	•	-	•	•	•	•	•	•
441	terminal box IP 56	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
442	terminal box IP 65	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
469	terminal box IP 66	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
Types of protection/Standards and regulations																					
144	VEM version for power plans acc. to EW-N 8269 (KA)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
314	VIK version	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
470	Ex VIK version	-	-	-	-	-	-	-	-	-	-	-	-	•	•	•	•	•	-	-	-
374	Degree of protection IP 54	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
125	Degree of protection IP 56	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
85	IP 57 S	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
170	Degree of protection IP 65	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
169	Degree of protection IP 66	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
137	marine version IP 55	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
138	marine version IP 56	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
307	special marine version acc. to EWN 8278 (mechanical)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
361	vertical design (in case of ship	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
382	combined approval for USA, Canada (c UL us)	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
387	Approval for USA (UL)	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	-	-
192	CSA version	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	-	-
194	NEMA version (electrically)	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
197	Rheinbraun standard EM 2.2	•	•	•	•	•	•	-	-	-	-	-	-	•	-	•	•	•	-	•	•
252	Kali + Salz (E 5.09)	•	•	•	•	•	•	-	-	-	-	-	-	•	-	•	•	•	-	•	•
353	Version for harbour cranes according to EW-N 8233	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
191	Shell-design (SH)	•	•	•	•	•	-	-	-	-	-	-	-	•	•	•	•	•	•	-	-
459	VEMoCHEM (VC)	•	•	•	•	•	-	-	-	-	-	-	-	•	•	•	•	•	•	-	-
471	Design for low temperature application -45 °C without shaft seals	•	•	•	•	•	•	-	-	•	•	•	•	-	-	-	-	-	-	-	•
472	Design for low temperature application -50 °C without shaft seals	•	•	•	•	•	•	-	-	•	•	•	•	-	-	-	-	-	-	-	•
473	Design for low temperature application -60 °C without shaft seals	•	•	•	•	•	•	-	-	•	•	•	•	-	-	-	-	-	-	-	•

56	63	71	80	90	100	100 LX, 112	132 T	132	160	180	200	225	250	280	315 S-MX	315 MY	315 L, LX	355 MY, M	355 MX, LY, L	400	450	500	560	630	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42.	
-	56	63	71	80	90	100		112	132	160	180	200	225	250	280	315 S-MX	315 L, LX	-	-	-				-	Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	Price-Code
																									Connection system/cable entry	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	K	K	K	X	X	X	terminal box right, left hand side	97
K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	K	O	O	O	O	K	K	K	terminal box sloping version	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	terminal box turned (gland towards D-/N-end/left-hand side)	98
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	lead length larger than 1000 mm (for 6 wires, for each started-on 500 mm) (only for built-in motors)	156
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	A	K	K	K	K	K	K	K	without terminal box, with cover plate (without cable price)	158
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	without terminal box, with cover box (without cable price)	159
X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	without terminal box, with cover box/flat connection system for max. 1m cable	337
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	K	K	K	K	K	K	terminal box next larger size	187
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	additional terminal box (without accessories)	188
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	terminal box for auxiliary contacts	196
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	terminal box grey cast-iron 25/63 A	279
-	-	-	-	-	-	-	-	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	VIK terminal box	279
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1000 A terminal box	289
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	N	N	O	-	-	-	-	630 A terminal box	310
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	N	N	-	-	-	-	housing rotated in longitudinal direction	302
K	K	K	K	K	K	K	K	X	X	X	X	X	X	X	X	X	X	X	K	K	K	X	X	X	terminal box N-end	168
X	X	X	X	X	X	X	X	K	K	K	K	K	K	K	K	K	K	K	K	K	K	X	X	X	KK N-Seite	357
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	terminal box IP 56	441
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	terminal box IP 65	442
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	terminal box IP 66	469
																									Types of protection/Standards and regulations	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	VEM version for power plans acc. to EW-N 8269 (KA)	144
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	VIK version	314
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Ex VIK version	470
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Degree of protection IP 54	374
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Degree of protection IP 56	125
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	IP 57 S	85
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Degree of protection IP 65	170
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Degree of protection IP 66	169
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	marine version IP 55	137
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	marine version IP 56	138
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	special marine version acc. to EWN 8278 (mechanical)	307
-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	vertical design (in case of ship	361
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	combined approval for USA, Canada (c UL us)	382
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	Approval for USA (UL)	387
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	CSA version	192
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	NEMA version (electrically)	194
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Rheinbraun standard EM 2.2	197
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Kali + Salz (E 5.09)	252
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	Version for harbour cranes according to EW-N 8233	353
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	Shell-design (SH)	191
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	VEMoCHEM (VC)	459
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Design for low temperature application -45 °C without shaft seals	471
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Design for low temperature application -50 °C without shaft seals	472
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Design for low temperature application -60 °C without shaft seals	473

Price-Code	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42. / Transnorm (IE1-)K20. (IE2-)WE0./W20. / Chapter	Standard motors	Pole-switching motors	Transnorm motors	Motors for converter-fed operation	Water-cooled motors	Slip-ring motors	Built-in motors	Fire-gas motors	Roller table motors, light-duty series	Roller table motors, ARB	Roller table motors, ARC	Roller table motors, DS..	Type of protection "eb" - Increased safety	Type of protection "d/de" - Flameproof enclosure	Type of protection "ec" - Increased safety	Protection by enclosure "tb", Zone 21	Protection by enclosure "tc", Zone 22	Motors for marine operation	Permanent magnet synchronous motors	Asynchronous generators
		2	2	3	4	5	6	7	8	9	9	9	9	10	10	10	10	10	11	12	13
Types of mounting																					
110	Flange without centring spigot	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
375	Deviating flange according to catalogue	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
111	Version with welded feet (steel feet), types of construction IM B6, IM B7, IM B8, IM V5[4], IM V6[4]	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
369	Version in vertical construction with Q bearings (required as of 315 MY)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
112	IM B35	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
476	IM V15[4], IM V36	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
339	IM B35K	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
113	IM B34	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
114	IM B5	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
362	IM V3[4]	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
356	IM V1[4]	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
117	Canopy for fan cover	•	•	•	•	-	•	-	•	•	-	-	•	•	•	•	•	•	•	•	•
338	IM B5 K	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
115	IM B14, IM V18, IM V19	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
142	IM 2202 (IM B17, 2nd shaft end included)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
352	Type of construction B5/Furnace flange (standard design)/Aluminium fan	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
288	PAD-mounted 8 foot holes under 45 deg	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
475	IM V18, IM V19	•	•	•	•	•		-	•	•	•	•	•	•	•	•	•	•	•	•	•
481	Fan cover made of steel sheet	•	•	•	•	-	•	-	•	•	-	-	•	•	•	•	•	•	•	•	•
428	Flange ring K21R a = 660/800	•	•	•	•	•	•	•	•	•	•	•	•	•	-	•	•	•	•	•	•
429	Steel flange K22R 355 a = 1000	•	•	•	•	•	•	•	•	•	•	•	•	•	-	•	•	•	•	•	•

56	63	71	80	90	100	100 LX, 112	132 T	132	160	180	200	225	250	280	315 S-MX	315 MY	315 L, LX	355 MY, M	355 MX, LY, L	400	450	500	560	630	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42.
-	56	63	71	80	90	100		112	132	160	180	200	225	250	280	315 S-MX	315 L, LX	-	-	-				-	Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	Price-Code
																									Types of mounting	
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	Flange without centring spigot	110
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	Deviating flange according to catalogue	375
-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	-	-	-	-	-	-	-	N	N	N	Version with welded feet (steel feet), types of construction IM B6, IM B7, IM B8, IM V5[4], IM V6[4]	111
-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	Version in vertical construction with Q bearings (required as of 315 MY)	369
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	IM B35	112
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	IM V15[4], IM V36	476
-	X	X	X	X	X	X	-	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	IM B35K	339
X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	IM B34	113
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	K	K	K	K	IM B5	114
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	IM V3[4]	362
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	IM V1[4]	356
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Canopy for fan cover	117
-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IM B5 K	338
X	X	X	X	X	X	X	X	X	X	X			A	A	A	A	A	A	-	-	-	-	-	-	IM B14, IM V18, IM V19	115
-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	IM 2202 (IM B17, 2nd shaft end included)	142
-	-	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Type of construction B5/Furnace flange (standard design)/Aluminium fan	352
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	PAD-mounted 8 foot holes under 45 deg	288
X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	IM V18, IM V19	475
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Fan cover made of steel sheet	481
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	Flange ring K21R a = 660/800	428
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	Steel flange K22R 355 a=1000	429

Price-Code	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42. Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	Standard motors 2	Pole-switching motors 2	Transnorm motors 3	Motors for converter-fed operation 4	Water-cooled motors 5	Slip-ring motors 6	Built-in motors 7	Fire-gas motors 8	Roller table motors, light-duty series 9	Roller table motors, ARB 9	Roller table motors, ARC 9	Roller table motors, DS.. 9	Type of protection "eb" - Increased safety 10	Type of protection "d/de" - Flameproof enclosure 10	Type of protection "ec" - Increased safety 10	Protection by enclosure "tb", Zone 21 10	Protection by enclosure "tc", Zone 22 10	Motors for marine operation 11	Permanent magnet synchronous motors 12	Asynchronous generators 13
Mechanical versions																					
107	Special shaft (shorter, thicker and thinner, 2nd shaft end included) Standard steel, same bearing size)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
108	Special shaft, 1 tapered shaft end (1:10)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
427	Special shaft, 2 tapered shaft ends (1:10)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
419	Shaft certificate 3.2 (required from some classification societies)	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
109	High-resistance rotor (Si 10)	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
116	Aluminium fan	•	•	•	•	-	•	-	•	•	-	-	•	•	•	•	•	•	•	•	•
190	Grey cast iron fan	•	•	•	•	-	•	-	•	•	-	-	•	•	•	•	•	•	•	•	•
195	Multi-wing fan (low-noise version)	•	•	•	•	-	•	-	•	•	-	-	•	•	•	•	•	•	•	•	•
330	Fan cover made of plastic	•	•	•	•	-	•	-	-	-	-	-	-	-	-	-	-	-	-	•	•
333	Protective cover for encoder	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
383	Vibration intensity B	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
165	Balancing against zero	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
166	High-speed version (HS)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
376	Balancing with full key	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
143	Cooling type IC 418 (Non-ventilated version (K21R/K11R-O) (FAN))	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
445	Cooling type IC 410 (Non-ventilated version)	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
146	External earthing terminal on housing	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
161	Dredger version (incl, TII, vibration-resistant)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
162	Version for the textile industry	•	•	•	•	•	•	-	-	-	-	-	-	-	-	-	-	-	•	•	•
163	Vibration-resistant version	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
177	Flange accuracy R according to DIN 42955	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
199	Condensate drain plug (1 piece)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
201	Condensate drain holes with felt plug (2 pieces)	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
455	Condensate drain plug (1 piece) Ex	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
280	Additional foot holes at the top of the housing	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
425	8 threaded holes in the housing on terminal box side	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
285	Screen cut out from fan cover	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
294	Housing with load bracket thread (2 pieces)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
322	Special fan	•	•	•	•	•	•	-	•	•	•	•	•	-	-	•	-	•	•	•	•
331	Foot contact face, milled	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
411	Housing with ring nut (lifting eye bolt)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
420	Housing in GGG50	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
421	End shield on D- or N-side in GGG50 (up to shaft size 132 T in GGG40)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
422	Flanged end shield in GGG50	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
423	Bearing cover made of steel (each piece)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
186	Tensioning rail (1 set = 2 pcs)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
432	Foundation block (Form A without cams 1 set = 4 pcs)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
433	additional eye bolt	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
386	RFID-Transponder (Memory design)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
463	Retrofit set for memory design (RFID-Transponder)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
474	Earthing ring for insulated bearings on both sides	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•

56	63	71	80	90	100	100 LX, 112	132 T	132	160	180	200	225	250	280	315 S-MX	315 MY	315 L, LX	355 MY, M	355 MX, LY, L	400	450	500	560	630	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42.	
-	56	63	71	80	90	100		112	132	160	180	200	225	250	280	315 S-MX	315 L, LX	-	-	-				-	Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	Price-Code
																									Mechanical versions	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Special shaft (shorter, thicker and thinner, 2nd shaft end included) Standard steel, same bearing size)	107
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Special shaft, 1 tapered shaft end (1:10)	108
-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Special shaft, 2 tapered shaft ends (1:10)	427
-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Shaft certificate 3.2 (required from some classification societies)	419
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	High-resistance rotor (Si 10)	109
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	Aluminium fan	116
-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	-	-	-	-	-	-	-	Grey cast iron fan	190
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Multi-wing fan (low-noise version)	195
-	-	-	-	-	-	-	-	-	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	Fan cover made of plastic	330
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Protective cover for encoder	333
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Vibration intensity B	383
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Balancing against zero	165
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	High-speed version (HS)	166
-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Balancing with full key	376
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Cooling type IC 418 (Non-ventilated version (K21R/K11R-O) (FAN))	143
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Cooling type IC 410 (Non-ventilated version)	445
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	External earthing terminal on housing	146
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Dredger version (incl, TII, vibration-resistant)	161
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	Version for the textile industry	162
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	Vibration-resistant version	163
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Flange accuracy R according to DIN 42955	177
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Condensate drain plug (1 piece)	199
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Condensate drain holes with felt plug (2 pieces)	201
X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Condensate drain plug (1 piece) Ex	455
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	Additional foot holes at the top of the housing	280
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	8 threaded holes in the housing on terminal box side	425
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Screen cut out from fan cover	285
-	-	-	-	-	-	-	-	-	-	-	-		-	X	N	N	N	N	N	N	A	A	A	A	Housing with load bracket thread (2 pieces)	294
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Special fan	322
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	Foot contact face, milled	331
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	A	A	Housing with ring nut (lifting eye bolt)	411
A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	Housing in GGG50	420
A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	End shield on D- or N-side in GGG50 (up to shaft size 132 T in GGG40)	421
A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	-	-	-	Flanged end shield in GGG50	422
-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N	N	Bearing cover made of steel (each piece)	423
-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Tensioning rail (1 set = 2 pcs)	186
-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Foundation block (Form A without cams 1 set = 4 pcs)	432
-	-	-	-	-	-	-	-	-	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	additional eye bolt	433
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	RFID-Transponder (Memory design)	386
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Retrofit set for memory design (RFID-Transponder)	463
-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	Earthing ring for insulated bearings on both sides	474

Price-Code	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42. Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	Standard motors 2	Pole-switching motors 2	Transnorm motors 3	Motors for converter-fed operation 4	Water-cooled motors 5	Slip-ring motors 6	Built-in motors 7	Fire-gas motors 8	Roller table motors, light-duty series 9	Roller table motors, ARB 9	Roller table motors, ARC 9	Roller table motors, DS.. 9	Type of protection "eb" - Increased safety 10	Type of protection "d/de" - Flameproof enclosure 10	Type of protection "ec" - Increased safety 10	Protection by enclosure "tb", Zone 21 10	Protection by enclosure "tc", Zone 22 10	Motors for marine operation 11	Permanent magnet synchronous motors 12	Asynchronous generators 13
Corrosion protection/painting																					
133	Special colours	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
452	Special colours, not available in colour system 01 (incl. colour system 02)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
135	Colour system 02; 02S „worldwide" (outdoors, indoors with high humidity) Corrosion class KK C2-C3 acc, to EN ISO 12944-2:1998	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
354	Colour system 04 (maritime/harbour climate)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
446	Colour system 05 (special paint for thermal class H)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
368	Colour system 06 (higher temperatures, humidity, outdoors) Corrosion class KK C2-C3 acc, to EN ISO 12944-2:1998	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
134	Colour system 07 (chemistry, higher temperatures, humidity, decontaminable) Corrosion class KK C3 acc, to EN ISO 12944-2:1998	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
443	Colour system 09L „Offshore" (UV resistant) Corrosion class KK C3 acc, to EN ISO 12944-2:1998	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
311	Colour system 09S „Offshore" (UV resistant) Corrosion class KK C4/5 acc, to EN ISO 12944-2:1998	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•
460	Colour system 010L „Offshore" Ex (> 200 mym)	-	-	-	-	-	-	-	-	-	-	-	-	•	•	•	•	•	-	-	-
461	Colour system 010S „Offshore" Ex (> 200 mym)	-	-	-	-	-	-	-	-	-	-	-	-	•	•	•	•	•	-	-	-
136	Protection against elevated climatic requirements (TII)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
412	Climate-resistant rotor	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
173	Layer thicknesses increased by 30 µm each	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
200	Stainless steel external bolts	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
286	Fan cover or N-bearing cover or N-end shield painted on the inside	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
287	Fan sprayed with epoxy resin varnish	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
351	Paint system acc, to special-drawing 3135	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
315	Zinc-plated fan cover	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
424	Flange free of grease and paint residues	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
Attachments																					
96	Centric attachment of encoder (bell/intermediate flange, shaft end, coupling) (K21F, K210)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
99	Centric attachment by means of a flange end shield, N-side (IM 2202)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
367	Centric attachment by means of combined mount	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
100	Attachment of tacho and encoder (behind fan cover) (put-on version without aggregate)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
418	Installation of Harting connector/switch (without plug)	•	•	•	•	•	•	-	•	•	•	•	•	•	-	-	-	-	-	•	•
150	Attachment of backstop (without lock)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
358	Brake attachment	•	•	•	•	•	-	-	-	•	•	•	•	•	•	•	•	•	•	•	•
479	Attachment of external fan	•	•	•	•	-	•	-	-	•	•	•	•	•	•	•	•	•	•	•	•
465	Attachment of gear	•	•	•	•	•	•	-	-	•	•	•	•	-	-	-	-	-	•	•	•

56	63	71	80	90	100	100 LX, 112	132 T	132	160	180	200	225	250	280	315 S-MX	315 MY	315 L, LX	355 MY, M	355 MX, LY, L	400	450	500	560	630	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42.	
-	56	63	71	80	90	100		112	132	160	180	200	225	250	280	315 S-MX	315 L, LX	-	-	-				-	Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	Price-Code
																									Corrosion protection/painting	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Special colours	133
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Special colours, not available in colour system 01 (incl. colour system 02)	452
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 02; 02S „worldwide“ (outdoors, indoors with high humidity) Corrosion class KK C2-C3 acc, to EN ISO 12944-2:1998	135
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 04 (maritime/harbour climate)	354
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 05 (special paint for thermal class H)	446
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 06 (higher temperatures, humidity, outdoors) Corrosion class KK C2-C3 acc, to EN ISO 12944-2:1998	368
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 07 (chemistry, higher temperatures, humidity, decontaminable) Corrosion class KK C3 acc, to EN ISO 12944-2:1998	134
A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 09L „Offshore“ (UV resistant) Corrosion class KK C3 acc, to EN ISO 12944-2:1998	443
A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 09S „Offshore“ (UV resistant) Corrosion class KK C4/5 acc, to EN ISO 12944-2:1998	311
A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 010L „Offshore“ Ex (> 200 mym)	460
A	A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Colour system 010S „Offshore“ Ex (> 200 mym)	461
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Protection against elevated climatic requirements (TII)	136
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Climate-resistant rotor	412
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Layer thicknesses increased by 30 µm each	173
-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Stainless steel external bolts	200
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Fan cover or N-bearing cover or N-end shield painted on the inside	286
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Fan sprayed with epoxy resin varnish	287
X	X	X	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Paint system acc, to special-drawing 3135	351
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Zinc-plated fan cover	315
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Flange free of grease and paint residues	424
																									Attachments	
A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Centric attachment of encoder (bell/intermediate flange, shaft end, coupling) (K21F, K21O)	96
A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	K	K	K	K	K	K	K	K	K	Centric attachment by means of a flange end shield, N-side (IM 2202)	99
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	A	Centric attachment by means of combined mount	367
A	A	A	A	A	A	A	A	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Attachment of tacho and encoder (behind fan cover) (put-on version without aggregate)	100
-	-	-	-	-	-	-	-	X	X	X	X	A	A	A	A	A	A	A	A	A	A	A	A	A	Installation of Harting connector/switch (without plug)	418
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Attachment of backstop (without lock)	150
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Brake attachment	358
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Attachment of external fan	479
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Attachment of gear	465

Price-Code	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42. Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	Standard motors 2	Pole-switching motors 2	Transnorm motors 3	Motors for converter-fed operation 4	Water-cooled motors 5	Slip-ring motors 6	Built-in motors 7	Fire-gas motors 8	Roller table motors, light-duty series 9	Roller table motors, ARB 9	Roller table motors, ARC 9	Roller table motors, DS.. 9	Type of protection "eb" - Increased safety 10	Type of protection "d/de" - Flameproof enclosure 10	Type of protection "ec" - Increased safety 10	Protection by enclosure "tb", Zone 21 10	Protection by enclosure "tc", Zone 22 10	Motors for marine operation 11	Permanent magnet synchronous motors 12	Asynchronous generators 13
Bearing arrangement																					
95	Oil-tight design (radial shaft sealing ring, N-side fixed bearing)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
118	Radial sealing ring, D-side (incl, N-side fixed bearing)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
119	Fixed bearing D-side	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
390	Fixed bearing, D-side, backlash-free	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
120	Fixed bearing N-side	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
121	Angular contact bearing D-side	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
122	Elevated transverse forces, D-side (incl, of fixed bearing, N-side)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
415	Insulated roller bearing	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
340	Reinforced bearing, D-side (inclusive of fixed bearing series 42..)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
332	Labyrinth seal	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
342	Bearing sealing with combined seal, D-side	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
151	Bearing control with a temperature sensor for each bearing point (D-side/N-side) (without additional terminal box)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
153	Bearing control with PT100 (2 conductors) for each bearing point	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
154	Bearing control with PT100 (4 conductors) for each bearing point	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
193	Relubricating device [6) 8)]	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
262	Insulated bearing, N-side	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
413	Insulated bearing, D-side	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
278	Flat lubricating nipple, stainless steel (for both sides)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
394	Tapered lubricating nipple (for both sides)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
321	Tapered lubricating nipple of stainless steel (for both sides)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
283	SPM bearing control with accessories (vlB) (per bearing arrangement)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
284	SPM prepared without nipple	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
152	SPM bearing control (with nipple) (2 pieces)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
434	SPM bearing control (with stainless steel nipple) (2 pieces)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
467	SPM bearing control with accessories (per bearing arrangement)	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
306	Bearing seal with radial shaft sealing ring 9RB	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
323	Double bearing seal, D-side (2 radial shaft sealing rings & grease compartment) [7)]	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
364	Axial shaft sealing ring	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
365	γ-ring	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
127	Special grease	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
Miscellaneous																					
147	2nd rating plate, loose	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
148	Customer's rating plate	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
414	Position plate	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
149	Stainless steel rating plate	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
253	Silicon-free design	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•	•
410	Handling costs for items supplied by customer	•	•	•	•	•	•	-	•	•	•	•	•	•	•	•	•	•	•	•	•
431	Coolant temperature ≥ 100 °C	•	•	•	•	•	•	-	•	•	•	•	•	-	-	-	-	-	•	•	•

N… standard version
X… special version at extra charge
O… without extra charge
A… upon request
K… not available
- not applicable

[1)] K22. 355 MX2, 4 is standard version
[2)] K22. 355 MY, M und MX6, 8 is standard version
[3)] Product range from Thurm suitable for converter operation
[4)] additionally Q-bearing for IM V15, IM V3, IM V1, IM V5, IM V6 (from size 315 MY necessary)
[5)] only possible for 200 LX2
[6)] relubrication device D-end not possible due to design version K21. 132 S, SX, M6, 8 und K21. 160 M, MX8
[7)] not possible when lubrication device is installed
[8)] Lubrication device standard for all motors from size K21. 315 MX upwards

56	63	71	80	90	100	100 LX, 112	132 T	132	160	180	200	225	250	280	315 S-MX	315 MY	315 L, LX	355 MY, M	355 MX, LY, L	400	450	500	560	630	IEC/DIN (IE1-)K21. (IE2-)WE1./WE2./W21. (IE3-)W41./W42.
-	56	63	71	80	90	100		112	132	160	180	200	225	250	280	315 S-MX	315 L, LX	-	-	-				-	Transnorm (IE1-)K20. (IE2-)WE0./W20. Chapter	Price-Code
																									Bearing arrangement	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	Oil-tight design (radial shaft sealing ring, N-side fixed bearing)	95
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Radial sealing ring, D-side (incl, N-side fixed bearing)	118
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Fixed bearing D-side	119
-	-	-	-	-	-	-	-	X	X	X	X	X	A	A	A	A	A	A	A	A	A	A	A	A	Fixed bearing, D-side, backlash-free	390
X	X	X	X	X	X	X	X	X	X	X	N	N	N	N	N	N	N	N	N	N	N	N	N	N	Fixed bearing N-side	120
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Angular contact bearing D-side	121
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Elevated transverse forces, D-side (incl, of fixed bearing, N-side)	122
-	-	-	-	-	-	-	-	-	-	-	-		-	-	X	X	X	X	X	X	X	X	X	X	Insulated roller bearing	415
-	-	X	X	X	X	X	X	-	-	-	-		-	-	-	-	-	-	-	-	-	-	-	-	Reinforced bearing, D-side (inclusive of fixed bearing series 42..)	340
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Labyrinth seal	332
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	Bearing sealing with combined seal, D-side	342
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bearing control with a temperature sensor for each bearing point (D-side/N-side) (without additional terminal box)	151
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bearing control with PT100 (2 conductors) for each bearing point	153
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bearing control with PT100 (4 conductors) for each bearing point	154
K	K	K	K	K	K	K	K	X	X	X	X	X	X	X	X	N	N	N	N	N	N	N	N	N	Relubricating device [6) 8)]	193
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Insulated bearing, N-side	262
								X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Insulated bearing, D-side	413
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Flat lubricating nipple, stainless steel (for both sides)	278
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Tapered lubricating nipple (for both sides)	394
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Tapered lubricating nipple of stainless steel (for both sides)	321
-	-	-	-	-	-	-	-	-	-	-	-		-	X	X	X	X	X	X	X	X	X	X	X	SPM bearing control with accessories (vlB) (per bearing arrangement)	283
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	SPM prepared without nipple	284
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	SPM bearing control (with nipple) (2 pieces)	152
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	SPM bearing control (with stainless steel nipple) (2 pieces)	434
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	SPM bearing control with accessories (per bearing arrangement)	467
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Bearing seal with radial shaft sealing ring 9RB	306
-	-	-	-	-	-	-	-	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Double bearing seal, D-side (2 radial shaft sealing rings & grease compartment) [7)]	323
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Axial shaft sealing ring	364
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	N	N	K	K	K	K	K	K	K	γ-ring	365
X	X	X	X	X	X	X	X	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	A	Special grease	127
																									Miscellaneous	
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	2nd rating plate, loose	147
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	Customer's rating plate	148
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Position plate	414
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Stainless steel rating plate	149
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Silicon-free design	253
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Handling costs for items supplied by customer	410
X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	Coolant temperature ≥ 100 °C	431

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