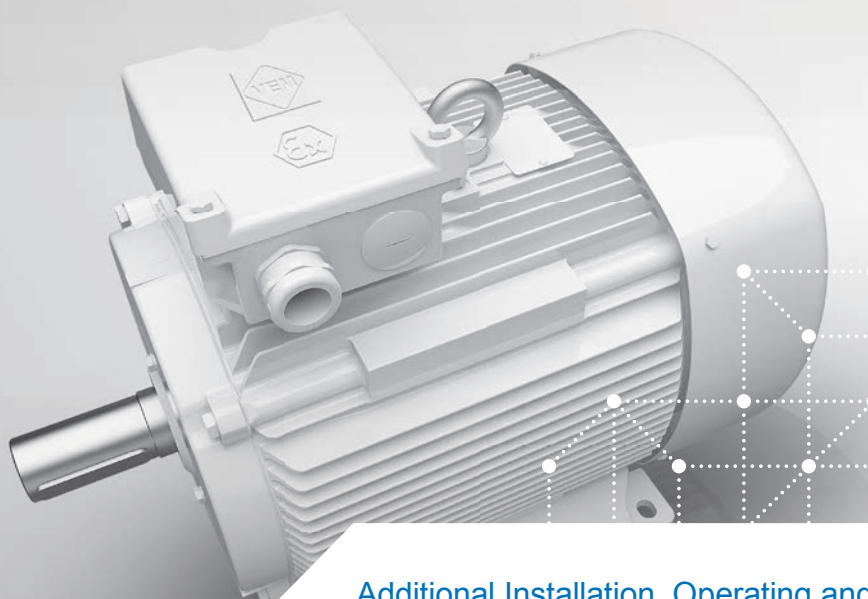




ELECTRIC DRIVES

FOR EVERY DEMAND



Additional Installation, Operating and Maintenance Instructions

Explosion-protected three-phase asynchronous motors with squirrel-cage rotor for low voltage



ATEX



For energy-efficient design the mark IE*- is added to the type designation, whereas *= 1, 2, 3 (acc. to IEC/EN 60034-30-1). (Example IE3-K11R 132S 4 Ex e IIC T3).


Type of protection increased safety "e" ("eb")


Type of protection "n" (increased safety "ec")


Type of protection by enclosure "t"


Design series (IE*-)K... and (IE*-) "W..R"




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تهران، کیلومتر ۱۱ بزرگراه لشگری (جاده مخصوص کرج)

روبروی پالایشگاه نفت پارس، پلاک ۱۲

**Characterisation of explosion-protected motors
QS certification with NB 0637 ... IBE XU Freiberg**

Designation acc. to RL 2014/34/EU (RL 94/9/EG) or TPI TC 012/2011		Designation acc. to	Designation acc. to
EU No. EAC NB	Group/category/ G (Gas) or D (Dust)	IEC 60079-0:2004/ EN 60079-0:2006 and/or IEC 61241-0:2004/ EN 61241-0:2006	IEC 60079-0:2007/EN 60079-0:2009 or IEC 60079-0:2011, modified + Cor.:2012 + Cor.:2013 / EN 60079-0:2012/A11:2013
CE 0637	Ex II 2G	Ex e II T1/T2, T3 or T4	Ex e IIC T1/T2, T3 or T4 Gb or Ex eb IIC T1/T2, T3 or T4 Gb
ERC Г508	Ex 1		
CE	Ex II 3G	Ex nA II T2, T3 or T4	Ex nA IIC T2, T3 or T4 Gc or Ex ec IIC T2, T3 or T4 Gc
ERC Г508	Ex 2		
CE 0637	Ex II 2D	Ex tD A21 IP65 T125°C	Ex tb IIIC Tx°C Db
ERC Г508	Ex		
CE	Ex II 3D	Ex tD A22 IP55 Tx°C (IP 65 conductive dust)	Ex tc IIIB Tx°C Dc (Ex tc IIIC Tx°C Dc, conductive dust)
ERC	Ex		
CE 0637	Ex II 2G II 2D	Ex e II T2, T3 or T4 Ex tD A21 IP65 Tx°C	Ex e IIC T1/T2, T3 or T4 Gb or Ex eb IIC T1/T2, T3 or T4 Gb Ex tb IIIC Tx°C Db
ERC Г508	Ex 1 -		
CE 0637	Ex II 2G II 3D	Ex e II T2, T3 or T4 Ex tD A22 IP55 Tx°C (IP 65 conductive dust)	Ex e IIC T1/T2, T3 or T4 Gb or Ex eb IIC T1/T2, T3 or T4 Gb Ex tc IIIB Tx°C Dc (Ex tc IIIC Tx°C Dc, conductive dust)
ERC Г508	Ex 1 -		
CE 0637	Ex II 3G II 2D	Ex nA II T2, T3 or T4 Ex tD A21 IP65 Tx°C	Ex nA IIC T2, T3 or T4 Gc or Ex ec IIC T2, T3 or T4 Gc Ex tb IIIC Tx°C Db
ERC Г508	Ex 2 -		
CE	Ex II 3G II 3D	Ex nA II T2, T3 or T4 Ex tD A22 IP55 Tx°C (IP 65 conductive dust)	Ex nA IIC T2, T3 or T4 Gc or Ex ec IIC T2, T3 or T4 Gc Ex tc IIIB Tx°C Dc (Ex tc IIIC Tx°C Dc, conductive dust)
ERC Г508	Ex		

[When indicating a maximum surface temperature: for zone 2 (gas):
total surface including rotor and windings; for zone 21, 22 (dust): outer surface (enclosure, shaft)!]



Motors with double identification are only intended for use in gas or dust explosive atmospheres. Use in hybrid mixtures must be checked and approved separately.

Generally notes for operating motors driven by frequency converters

Commissioning of explosion-proof asynchronous motors driven by frequency converters is only allowed if the motors are specially designed, produced, tested, certified and marked for this purpose. Especially attention has to be paid to the notes of the producer. A suitable choice of the frequency converter and/or the use of filters have to secure that the maximum allowable pulse voltage at the motor terminals will not be exceeded.

The following values of the maximum pulse voltage have to keep according to series and options:

Series K11./K10./K12./K21./K20./K4.R/W.1R/W.2R
Size 56-132T¹⁾ $\hat{U} \leq 1000$ V
Size 56-132T¹⁾ acc. to Sp.2945 $\hat{U} \leq 1350$ V
Size 132 [KV0., 112] up to 400 $\hat{U} \leq 1350$ V

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Series KU1./KU0./KU2./WU1R/WU2R²⁾

Size 56-132T¹⁾ acc. to Sp.9382

Size 132 [KV0., 112] up to 400

$\hat{U} \leq 1560$ V

$\hat{U} \leq 1800$ V

Series KV1./KV4./KV0./KV2./WV1R/WV2R²⁾

Size 132 [KV0., KV4. 112] up to 400

$\hat{U} \leq 2500$ V

¹⁾ 132T... Size 132 produced by VEM motors Thurm GmbH

²⁾ The marking of the series K11./K10./K12./K21./K20./K4.R/W.1R/W.2R with suffixed TU or TV is possible with certain designs.

It has to be guaranteed that the supply voltage at the motor terminals (keep into attention the voltage drop over the used filters) in any case has to be equal to the data at the name plate of the motor.

If the voltage at the terminals of the motor is smaller than the rated voltage at the name plate because of voltage drops at the frequency converter, the cables, reactor coils or filters the rated frequency has to be lowered in relation with the voltage drop. This measure results in a smaller variable speed range.

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The operation of the motor driven by a frequency converter is only allowed within the operating points at the name plate. Shorttime exceeding of the operating current of the motor up to 1.5 times of the rated current for maximum 1 minute is only allowed for every 10 minutes. The maximum speed or frequency of the motor has never to be exceeded. The measurement of the imbedded thermal protector of the windings has to keep the requirements of Declaration 2014/34/EU and the concerning protecting unit must fulfill Exdescription II (2) G. Multi-motor operation is not allowed. For installation and commissioning of the frequency converter concerning notes and the operating manual of the producer have to be payed in attention. The switching frequency of the converter shall be setup higher than the minimum value which is written at the name plate.

Equipment of Category 2 driven by frequency converter

For the type of ignition protection increased safety "e" (new: "eb") (EPL Gb) as well as protection by enclosure "tb" (EPL Db) there are special EC-type examination certificates necessary which explicitly approve the operation at a frequency converter.

The required conditions and setups of the system consist of motor, frequency converter and protecting apparatus are described within the concerning EC-type examination certificates, the EU Declarations of Conformance, the nameplate and the data sheets.

Equipment of Category 3 driven by frequency converter

For the type of ignition protection "n" (new: increased safety "ec") (EPL Gc) as well as protection by enclosure "tc" has to be made so that motors driven by frequency converter with variable speed and/or variable voltage must be tested with a defined frequency converter or a similar frequency converter according the specification of output voltage and current.

Alternatively the thermal class may be defined by calculation. The necessary parameters and conditions are written at the name plate and within the documentations of the motor.

Electromagnetic Compatibility

When the motor is operated in connection with a frequency inverter, in particular with builtin thermistors and other sensors, it is possible that emitted interference occurs depending on the type of inverter. It must be avoided to exceed the limit values given in IEC/EN 61000-6-3 for the drive system consisting of motor and inverter. Please observe the EMV directions of the inverter manufacturer under all circumstances.

Efficiency classes

The specification of the efficiency class (IE class) according to IEC/EN 60034-30-1 is allowed for explosion protected motors. Indicated are IE class and rated efficiency. The determination of the motor efficiency is done with direct measurement complying with IEC/EN 60034-2-1 for motors up to 1 kW (chapter 8.1.1) and with the summation of losses method and determination of residual losses for motors > 1kW (chapter 8.2.2.5.1). The type designation is extended with a prefix (example IE3-K11R 132 S4...).

Installation and electrical connection

At installation and start of operation the security advices that are enclosed with the motor have to be observed. Installation work shall only be done by qualified personnel who is skilled because of a technical education, expertise and schooling of knowledge about



- security regulations,
- accident prevention regulations,
- standards and approved rules of technique (for example VDE-regulations, standards).

The qualified personnel must have the ability to assess the assigned job, identify possible dangers and avoid them. The qualified personnel must be authorized by the person in charge for security of the plant to carry out the necessary work and tasks.

Installing electrical equipment in hazardous areas requires, inter alia to observe the following rules in Germany:



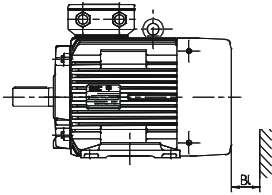
- BetrSichV
"Operational Safety Act",
- TRBS
"Technical rules for industrial safety"
- GefStoffV
"Hazardous Goods Regulations"
- IEC/EN 60079-14
"Explosive atmospheres - Part 14: Electrical installations design, selection and erection"

Outside of Germany the correct national regulations have to be observed.

Non-ventilated motors without self-ventilation are cooled by free convection with rib cooling at the motor housing. Unacceptable warming is avoided by reducing the output/winding design and this is checked with type testing and certification. To ensure the selected temperature class is kept at all times, please always ensure free convection. The motor must not be encased.

Environmental effects

The permissible coolant temperature (room temperature at place of installation) according to IEC/EN 60034-1 is max. 40°C/min. -20°C without labelling and the permissible altitude of site is up to 1000 m above sea level (other than the given values have to be specified on the name plate of the motor and must be certified separately if necessary). It should be noted that the cooling air can flow freely through the air inlet openings and through the air outlet openings freely and can not be sucked back directly. Inlet and outlet openings have to be protected against pollution and dirt particles. The direct intake of discharged air from neighbouring aggregates must be prevented by suitable measures. The minimum distance of air inlet of the fan cover against any obstacles (dimension BI) has to be observed under all circumstances.



Size	BI [mm]
63, 71	14
80, 90	16
100, 112	20
132, 160, 180, 200	40
225, 250	90
280 ... 315	100
355	110
400	110

It must be prohibited that foreign particles and liquids can fall into the fan of motors with vertical shaft orientation. This shall be done as follows:

Shaft end directed downwards:

The protection cover of the fan is equipped with a protective roof (supplied condition). Alternatively, the operator can implement the protection against ingress of foreign bodies and liquids.

Shaft end directed upwards:

For type of constructions with shaft end upwards the operator has to ensure that no foreign substances can fall inside from above. For shaft ends directed upwards it must be prohibited that water or other liquids can penetrate into the motor next to the shaft. During installation of surface cooled motors it has to be observed that the condensate drain holes are located at the lowest possible place. If the condensate drain holes are closed, the screws must be reinserted with a sealant after drainage of condensation water. If the condensate drain holes are open, the direct contact with a jet or gush of water must be avoided. A careful installation of the motors on an exactly level support has to be ensured to avoid strain when tightening the machine. Machines that shall be coupled must be adjusted exactly. If possible elastic couplings shall be used.

Motor connection

The connection has to be done by qualified personnel according to the valid security regulations. Outside of Germany the required national standards must be applied. Name plate designations have to be observed under all circumstances!



Compare current type, mains voltage and frequency!

Mind connection type!

Mind rated current for motor protection switch setting!

For motors with type of protection increased safety „e“ (“eb”) the t_E -time and the relative starting current I_A/I_N has to be observed!

Connect the motor according to the connection diagram inside of the terminal box!

Earthing shall be done with the earthing clip that can be found at the enclosure or at the end shield depending on the type of construction. In addition all motors are equipped with a ground conductor clamp inside of the terminal box. Unused cable glands of the terminal box have to be closed for protection against dust and humidity. For electrical connection the standard security and starting instructions are valid. The cable glands or screwed sealing plugs must be admitted for use in Ex-applications. The installation torques, sealing areas and clamp ranges of the cable clamps given by the manufacturer have to be observed unconditionally. Supply cables have to be selected according to DIN VDE 0100 taking into account rated current and operational conditions (i.e. ambient temperature, method of cable installation etc. complying with DIN VDE 0298 and IEC/EN 60204-1).



For room temperatures of more than 40°C cables have to be used, that are allowed for an operation of at least 90°C. This is also valid for motors that are marked with X on the supplemental sheet of the EC-type examination certificate which indicates special requirements for the cable design.

Take extra care when connecting the supply cables in the terminal box of the motor. The nuts of the connection screws have to be fastened without force. For motors with a terminal board fitted with slotted bolts according to directive 2014/34/EU (RL94/9/EC) only cable lugs complying with DIN 46295 shall be used. The cable lugs are fixed with pressure nuts with integrated spring washer. Alternatively a solid round wire can be used. The diameter of the wire must be suitable for the slot width of the slotted bolt. When inserting the feed line in the terminal box it has to be secured that no tensile loading acts on the cables. The inside of the terminal box must be kept clean. The seals must be undamaged and have to be fitting. The terminal box must always be closed when the motor is in operation.



Attention, do not open terminal boxes in atmospheres with risk of dust explosions when they are still hot from operation!

On order type AK 16/5 can be delivered as additional separate terminal box for motors (IE-)KPR/KPER 56 - 132S..T. The installer must have the permission to install electric equipment in areas with risks of explosions and must implement the motor connection diagrams. The creepage distances and air gaps are kept by preassembly of the terminal board (connection plate) and the block for connecting PTC thermistors or anti condensation heating. The type of protection IP 55(66) is kept by using a closed base plate with 4 x M4 threads and dimensions 56 x 56, as well as the included seals and standard parts.

Terminal box overview

Terminal box type	Terminal board	$I_{B \max}$ [A]	Q_{Bmin} [mm ²]	Q_{Bmax} [mm ²]	Terminal type	Connecting thread	a [mm]
KA 05-13	KB 5580	27.5		2.5	U-clamp terminal	M4	
25 A	KB 3Ex (KS 10A)	53	6	10	slot terminal	S10 x 1	4.3 ± 0.1
63 A	KB 4Ex (KS 14A)	72	10	16	slot terminal	S14 x 1.25	6.3 ± 0.2
100 A	KB 4Ex (KS 14A)	72	10	16	slot terminal	S14 x 1.25	6.3 ± 0.2
200 A	KB 5Ex (KS 18A)	118	25	35	slot terminal	S18 x 1.5	9.2 ± 0.2
25 AV	KL 155	30		4	U-clamp terminal	M5	-
25 AV	KB 5590Ex/d 5,2	35		4	U-clamp terminal	M4	-
63 AV	KB 5121Ex-3	58.5		10	U-clamp terminal	M5	-
100 AV	KB 5121Ex-3	58.5		10	U-clamp terminal	M5	-
100 AV	KB 5130Ex	114		35	U-clamp terminal	M6	-
200 AV	KB 5130Ex	114		35	U-clamp terminal	M6	-
100/63 AV	KM 8/6, VEM 8/6	63		10	Stud/U-clamp terminal*)	M6/M5	-
200 A-SB	KM 10/8, VEM 10/8	100		70	Stud/saddle terminal	M8/ 2 x M6	-
400 AV	KB 5130 Ex	118		35	U-clamp terminal	M6	-
400 AV	KM 10/8, VEM 10/8	100		70	Stud/saddle terminal	M8/2 x M6	-
400 A-SB	KM 10/8, VEM 10/8	100		70	Stud/saddle terminal	M8/2 x M6	-
400 A-SB	KM 16/12, VEM 16/12	250		120	Stud/saddle terminal	M12/2 x M10	-
630 A	VEM KLP 630-16	455	35	300	Stud/screw terminal	M16M12/M8	-
1000 A	VEM KLP 1000	1000	70	2 x 240	Current rail	M10	-
K1X 200 A	KM 10/8, VEM 10/8	100		70	Stud/saddle terminal	M8/2 x M6	-
K2X 200 A	KM 10/8, VEM 10/8	100		70	Stud/saddle terminal	M8/2 x M6	-
K1X 400 A	KM 16/12, VEM 16/12	250		120	Stud/saddle terminal	M12/2 x M10	-
K2X 400 A	KM 16/12, VEM 16/12	250		120	Stud/saddle terminal	M12/2 x M10	-

$I_{B \max}$ max. rated current
 Q_{Bmin} / Q_{Bmax} max. rated crosssection
 a slot width of the slotted bolt (terminal board according to DIN 22412)
 M_{Anzug} max. tightening torque for connecting thread
 *) for single-core connection of solid conductors 6...10 mm², connector formed as loop

Tightening torques for connections (DIN 46200)

Thread Ø	S10x1	S14x1,25	S18x1,5	M4	M5	M6	M8	M10	M12	M16	M20
Terminal board (Motor)	-	-	-	1.5	2.5	4	7.5	12.5	-	15	-
Terminal stud	6	10	20	1.2	1.2	3	6	10	15.5	30	52
Screw terminal							7.5		20		
U-clamp terminal/ saddle terminal	-	-	-	1.2	1.2	3	-	10	-	-	-

Seal for terminal box

Seal	Permitted coolant temperature
Surface seal, silicon red, 3 mm thick	
Silicone foam Ø 8 mm white	-40°C
EPDM E 9566, 3 mm thick *)	
EPDM, black, 3 mm thick	-30°C

*) only terminal box KA 05-13

Axial shaft gasket

Series (IE.-)K1.R 112 up to 400, (IE.-)W.1R 112 up to 315, (IE.-)W.2R 400

Seal material	Permitted minimum coolant temperature
FPM 80, FKM	-25°C
Silicone	-30°C

Tightening torques for bolts (terminal box, end shield, bearing cover)
Series (IE.-)K1.R 112 up to 400, (IE.-)W.1R 112 up to 315, (IE.-)W.2R 400

Thread Ø	M5	M6	M8	M10	M12	M16	M20
End shield	-	-	25	45	75	170	275
Bearing cover	5	8	15	20	20	-	-
Terminal box	-	4	7.5	12.5	-	20	-

Tightening torques for bolts (terminal box, end shield, bearing cover)
Series (IE.-)KPER/O 63 to 132T, (IE.-)KPR/O 56 to 100

Type		Type of construction	End shield		Fixed bearing cover		Terminal box	
(IE.-)KPER/O	(IE.-)KPR/O		DS	NS	DS	NS	or adapter	cover
bolts/tightening torque for bolts M_A								
63...	56...	all	M 4 2.0 Nm	M 4 2.0 Nm	M 4 1.5 Nm (for (IE.-) KPR/O 100 L M 5 2.0 Nm)	M 4 1.5 Nm	M 4 2.5 Nm	M 5 1.0 Nm
71...	63...		M 5 4.0 Nm	M 5 4.0 Nm				
80...	71...		M 6 7.0 Nm	M 6 7.0 Nm				
90...	80...		M 8 10.0 Nm	M 8 10.0 Nm				
100 L	90...	B3	M 8 10.0 Nm	M 8 10.0 Nm	M 5 2.0 Nm	M 5 2.0 Nm	M 4 2.5 Nm	M 5 1.0 Nm
100 LX,112...	100...	B5, B14	M 8 15.0 Nm	M 8 10.0 Nm	M 5 2.0 Nm	M 5 2.0 Nm	M 4 2.5 Nm	M 5 1.0 Nm
132 S...T	-	B3, B14- FT130	M 8 10.0 Nm	M 8 10.0 Nm	M 5 2.0 Nm	M 5 2.0 Nm	M 4 2.5 Nm	M 5 1.0 Nm
		B5, B14	M 8 15.0 Nm	M 8 10.0 Nm	M 5 2.0 Nm	M 5 2.0 Nm	M 4 2.5 Nm	M 5 1.0 Nm

Axial shaft gasket
Series (IE.-)KPER/O 63 to 132T, (IE.-)KPR/O 56 to 100

Seal material	Permitted minimum coolant temperature
FKM	-20°C

Motors with type of protection increased safety “e” (“eb”) and with outgoing cable (including the design version with flat terminal box with separate certificate according to directive 2014/34/EU (RL94/9/EC)

The outgoing cable is led through with 4 or 7 conductors according to the demands of the customer.

If the entire terminal box is delivered and the connection is done in an Exprotected surrounding, than the following instructions have to be observed:

1. When mounting the terminal box at least the requirements for type of protection IP 54 must be fulfilled.
2. For compliance with the required clearances the terminal socket has to be fastened according to the indicated drawing of holes.
3. The inner earth conductor from the motor (green/yellow) with crimped lug has to be placed under the clamping yoke of the earth connection.
4. The outgoing cables of the motor have to be soldered into the angled lugs of the terminal socket. The correct connection U1, V1, W1 (U2, V2, W2) has to be observed.

When mounting the aggregate please take note that the motor number on the name plate agrees completely with the number on the riveted plate inside of the terminal box cover.

Protective measures against unacceptable warming

If there is no other information on the type examination certificate or on the name plate concerning duty type and tolerances, electrical machines are designed for continuous duty and normal, not frequently recurring starts, at which no significant warming occur. The motors shall only be operated in the duty type indicated on the name plate. If no specification of duty type is done on the name plate, the motors must only be operated in continuous duty S1.

The range A of the voltage and frequency limits of IEC/EN 60034-1 (DIN VDE 0530, part 1) – voltage $\pm 5\%$, frequency $\pm 2\%$, shape of curve, mains symmetry – has to be observed, so that the warming is kept within the permissible limits. Motors for area B of the voltage limits are marked separately on the rating plate. Bigger deviations from design values can result in excess warming of the electrical machine to unacceptable temperatures. These deviations have to be indicated on the name plate. The motor has to be protected against unacceptable warming at starting for example with a motor protection switch. That means a current-dependent delayed protection switch according to DIN VDE 0660 or a similar device for all phases has to be installed, so that unacceptable warming is prevented. The protective device must be adjusted to the rated current. Windings in deltaconnection have to be pro

ected by connecting the release or relay in series with the phase windings. Selection and adjustment of the releases must be based on the rated value of the phase current ($\times 0.58$ rated current of the motor). If such a connection is not possible, suitable protection switches must be used, for example with phase failure control. For polechanging motors current-dependent delayed releases or relays have to be provided for each rotational speed level that can be locked against each other.



For type of protection increased safety "e" ("eb") the starting will be controlled as well. Therefore the protection device must switch off within the time period t_E that is given for the corresponding temperature class when the rotor is blocked. The requirement is fulfilled if the release time (it can be taken from the release characteristics (starting temperature 20°C) for the ratio I_A/I_N is not higher than the indicated t_E time.

Electrical machines of type of protection increased safety "e" ("eb") for heavy starting (start-up time $> 1,7 \times t_E$ time) must be protected by a starting control according to the information of the certificate of conformity. They have to be certified accordingly.



Thermal motor protection by means of direct temperature monitoring of the winding is permissible if this is certified and indicated on the name plate. The protection consists of thermo couples according to DIN 44081/44082 that ensures explosion protection together with a tripping device with type of protection marking Ex II (2) G. For polechanging motors it is necessary to have separate protection devices for each rotation speed level, that can be locked against each other.

Auxiliary devices

Explosion-protected motors can be equipped with different auxiliary devices as option:

Additional thermal motor protection

For monitoring the stator winding temperature it is possible to have thermo couples installed in the motor (PTC thermistors, KTY or PT100). For their connection suitable auxiliary clamps for auxiliary circuits are available in the main terminal box or in additional terminal boxes. The connection is done according to the attached connection diagram.

Thermal motor protection as inherent protection

The use of thermal winding protection as inherent motor protection is only permissible if the operation is tested separately and certified by a notified body. On the name plate instead of the t_E time a t_A time is marked. In addition the following text will be printed on the name plate: "operation only with tested PTC tripping device and marking Ex II (2) G".



"Do only operate with approved PTC-Thermistor-Relays with indication Ex II (2) G".

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Anti-condensation heating

The heating tapes must comply with the directive 2014/34/EU (RL94/9/EC). The heating power and the input supply voltage are indicated on the name plate of the motor. For their connection either in the main terminal box or in the auxiliary terminal boxes suitable clamps for auxiliary circuits are provided. The connection is done according to the attached connection diagram. The anti-condensation heating has to be switched on only after disconnection of the motor. It shall not be switched on while the motor is in operation.

Forced ventilation unit

The fans must comply with the directive 2014/34/EU (RL94/9/EC). The forced ventilation unit is dissipating the lost heat at operation of the main motor. During operation of the main motor the motor of the forced ventilation unit has to be switched on. After disconnection of the main motor the forced ventilation has to continue depending on the temperature. For motors with forced ventilation units that are dependent of the sense of rotation, the sense of rotation has to be observed unconditionally (see rotation mark). Only manufacturer approved forced ventilation units shall be used. The forced ventilation unit has to be connected according to the connection diagram that is supplied inside of the terminal box.

Special design for terminal box on N-side

The terminal box for this special design is located on N-side of the motor before the fan cover. To realise this design the stator housing was turned during production. Special marking for type designation:
KNS... for sizes 56 to 132...T
(VEM motors Thurm GmbH)
KN ... for sizes 112 to 400 (VEM motors GmbH)
For motors of category 2 a special approval is necessary.

Fitting with RFID transponder (Memory motor)

As option it is possible to equip the motor with an RFID transponder (TAG). This feature is called memory motor, marked with "MM" according to factory standard EW-N 1002, page 13. The transponder D14-TAGspecial ATEX (RFID System iID@2000, 13.56 MHz based on ISO 15693 is used.



The reading of the data may be carried out in areas with an explosive atmosphere only with a reader approved in accordance with Directive RL 2014/34/EU (Directive 94/9/EC).

External heat and cooling sources

No extra measures will be necessary for existing external heat and cooling sources, if the temperatures at the installation site are not exceeded. If the temperatures are exceeded or impacts on operational temperatures or maximum surface temperatures can be expected provisions will have to be made to maintain and confirm explosion protection. If in doubt please contact the manufacturer.

Maintenance and repair

In Germany maintenance, repair and changes of explosion-protected machines have to be done taking the workplace safety ordinance (BetrSichV), the explosion protection ordinance (ExVo, 11.GSGV), the security advices and the description of the general maintenance manual into account.

Outside of Germany the required national standards must be applied.

More information about testing and maintenance of electrical systems or repair and reconditioning of electric equipment can be found in IEC/EN 60079-17 and IEC/EN 60079-19. Activities that will influence the explosion protection such as:

- repair of the stator winding and of the terminals,
- repair of the ventilation system
- repair of the bearings and of the sealing of dust explosion protected motors (Ex 2D, 3D).

This must only be done by VEM service personnel or by authorized workshops with trained personnel which is qualified for such tasks by industrial training, experience and special schooling.

For dust explosion-protected motors the dust explosion protection is depending very much on the local environmental conditions. For that reason the motors have to be checked and maintained regularly.



Thick layers of dust will result in a temperature rise on the surface of the motor due to thermal insulation. Layers of dust on the motors or even the total coverage should be avoided as far as possible by suitable installation and constant maintenance.

The indicated surface temperature of the motor is only valid, if the dust layer on the motor is max. 5 mm. The securing of these conditions (dust type, maximum layer thickness and other) has to be assured. The motor shall not be opened before a suitable time has passed to reduce the inner temperatures to values that are not ignitable. If the motors have to be opened for maintenance or repair, the work has to be done in a dust-free room if possible. If this is not possible suitable measures have to be taken to prohibit that dust can collect inside of the enclosure. At disassembly take extra care that the sealing parts like sealing, end faces and other are not damaged.

Careful and regular maintenance, inspections and revisions are necessary to detect and clear faults in time, before consequential damages will happen. As individual operating conditions can not be defined for all applications the listed terms represent a general advice for undisturbed operation. Individual local conditions (degree of pollution, load, etc.) must be taken into account when adjusting these terms. The advices within the standards EN 60079-17 and EN 60079-19 have to be considered as well.



Inadmissible deviations detected during the inspections have to be eliminated immediately.

What to do?	Time Period	Terms
First inspection	After about 500 operating hours	½ year at the latest
Control of air circulation and surface of motor	Depending on local environmental pollution	
Relubrication (as option)	See name plate or relubrication sign	
Main inspection	After about 8,000 operating hours	Once a year
Remove condensate water	Depending on the local environmental conditions	

First Inspection

An initial inspection of the motor must be organized after approximately 500 hours of operation, but not later

than half a year after start of operation. The following examinations will be done at the motor:

Measure	During operation	At standstill
Check of the electric characteristics	X	
Check of the running noises. When the motor is running, it is checked if the quiet running has changed for the worse.	X	
Check of the bearing temperatures. It is examined if the permissible bearing temperatures will not be exceeded during operation of the motor.	X	
Check the intakes of the cooling air. There must be no damages.	X	X
Check of the foundations. There must be no cracks or other damages like depressions.	X	X
Check of the fastening bolts. All bolts used for fixing mechanical and electrical connections must be tight with the required torque.		X

Main Inspection

The main inspection of the motor must be organized annually after approximately 8,000 hours of operation. The following examinations will be done at the motor:

Measure	During operation	At standstill
Check of the electric characteristics	X	
Check of the running noises. When the motor is running, it is checked if the quiet running has changed for the worse.	X	
Check of the bearing temperatures. It is examined if the permissible bearing temperatures will be exceeded during operation of the motor.	X	
Check the intakes of the cooling air. There must be no damages.	X	X
Check of the foundations. There must be no cracks or other damages like depressions.	X	X
Check of the motor alignment. The motor alignment must be within the given tolerances.		X
Check of the fastening bolts. All bolts used for fixing mechanical and electrical connections must be tight with the required torque.		X
Check of the insulation resistance. The insulation resistance of the winding must be sufficiently high, according to the requirements in the maintenance manual.		X
Check of the potential, the earth and the shield connections. The examination must check if the cables and used insulation materials are in good conditions. They must not be broken, cracked or faulty in any other way.		X
Check the cleanness of the surface of the motor and examine that the dust depositions are not higher than 5mm.		X

Inspection at faults

Extraordinary operating conditions like overload or short circuit are faults which overload the motor in electrical and/or mechanical kind. Even natural disasters may be a cause for extraordinary operating conditions and faults. After all such events main inspections have to be carried out immediately.



The necessary relubrication intervals for anti-friction bearings are different to these inspection intervals. They have to be observed as well!

The motors up to size 315M are equipped as standard with anti-friction bearings with life-time lubrication. From size 315MX upwards they are equipped with relubrication devices which can be ordered for smaller motors as option. Information about bearings and relubrication can be found in the general installation, maintenance and operation manual or on the name plate or relubrication sign.



Maintenance works (without relubrication) has to be done at standstill of the motor. It has to be assured that the machine is secured against reconnection and labelled with an appropriate sign.

In addition the security advices and accident prevention regulations of the manufacturers for the use of oils, lubricants and detergents has to be observed! Adjacent live parts have to be covered or secured! It has to be assured that the auxiliary circuits like anti-condensation heating are dead (zero potential). For design versions with condensate drain hole please observe that the drain plug screw has to be lubricated with a suitable sealant (for example Epple 28) before relocking.

The work has to be marked with an additional repair sign including the following information:

- date,
- executive company,
- if necessary type of repair,
- if necessary marking of the person legally authorised in accordance with the BetrSichV.



If the operations are not done by the manufacturer, they must be approved by a person legally authorised in accordance with the BetrSichV. He has to issue a written confirmation or mark the machine with his test mark. Outside of Germany the relevant state regulations have to be observed.

Painting and impregnation after repair or maintenance work



After repainting of explosion-protected motors or after impregnation of a complete stator that has been rewinded, bigger layers of paint or resin can be found on the surface of the motors. (This can result in electrostatic charges with risk of explosion during discharge). Nearby charging processes can also result in electrostatic charge of complete surfaces or parts of the surface. There is the risk of explosion due to discharge. Therefore the requirements according to IEC/EN 60079-0: Equipment - General requirements, article 7.4 and TRBS 2153 must be observed under all circumstances:

Limitation of the total thickness of paint or insulation layer depending on the individual explosion group:

- IIA, IIB: Total layer thickness ≤ 2 mm
- IIC: Total layer thickness $\leq 0,2$ mm

Limitation of the surface resistance of the used paint or resin to:

- IIA, IIB, IIC, III surface resistance $\leq 1G\Omega$ for motors of group II and group III

Breakdown voltage ≤ 4 kV for explosion group III (only dust, measured according to the method described in IEC 60243-1 for thickness of insulation material).

In addition the specifications of IEC/EN 60079-32 Electrostatic risks, especially annex A: Basics of static electricity, annex B: Electrostatic discharges in special situations and annex C: Combustibility of materials should be observed.

Spare parts



Except for standard, commercially available and equivalent parts (like anti-friction bearings) only original spare parts (see spare parts list) shall be used; this applies especially for seals and connection parts. For spare parts orders the following information is necessary:

- Spare parts name
- Motor type
- Motor number

Storage

For storage or use outside we recommend the use of a protection cover. A long term exposure with direct intensive solar radiation, rain, snow, ice or dust must be avoided.

Long term storage (more than 12 months)

Long term storage must be done indoors in vibration-free, dry rooms with temperatures not below -20°C and not above $+40^{\circ}\text{C}$. The storage environment must not contain aggressive gas, vapours, dusts and salts. Preferably motors shall be moved and stored only in original packing. Storage and transport with motors standing on their fan covers is not allowed. Additionally unprotected metal surfaces like shaft ends and flanges must be protected with a medium for longtime corrosion protection in addition to the existing factory-provided temporary corrosion protection. If there is a risk of motors being covered by moisture from condensation, please provide precautionary measures against humidity. Than a special packing in airtight sealed plastic foil is necessary or as alternative packing in plastic foil with desiccants. Please put desiccant bags in the terminal box as well. For the transport please use the eye bolts/attachment eyes of the motors together with suitable lifting accessories. The eye bolts/attachment eyes must only be used for lifting the motors without additional mountings like foundation plates, gears and others.

Motors with reinforced bearings are supplied with a transportation safety device. The transportation safety device at the shaft end must only be removed during installation of the motor and before switching on. Turn the shafts at least once a year so that false brinelling is avoided. During longer periods of storage the working life of the grease is reduced (ageing). When using open bearings it is recommended to check the condition of the grease once a year. If a pollution or oil drainage is visible, the grease must be exchanged. Closed bearings (ZZ 2RS) must be replaced after storage times > 48 months.

Disposal

When disposing of the motors please observe applicable national law.

In addition please take care that all oil and grease is disposed according to the ordinance of waste oils (Altölverordnung). They must not be contaminated with solvents, cold cleaners and paint residues. Before recycling the individual materials must be separated. Most important components are grey cast iron (housing), steel (shaft, stator and rotor sheets, consumables), aluminium (rotor), copper (windings) and plastics (insulation materials like for example Polyamide, Polypropylene and others). Electronic components like printed circuit boards (inverter, encoder, etc.) must be recycled separately.

Terminal board connections



In standard design surface cooled motors are adapted for both rotational directions. An exception are the 2-pole motors from size 355 and low-noise motors, which are characterized by a "G" behind the number of poles. They are equipped with a fan dependent on the direction of rotation. If such fans or return stops are used a sign for sense of rotation has to be fixed on the fan cover.

The connections U1, V1, W1 at phases L1, L2, L3 (in alphabetical or natural succession) always produce clockwise rotation. However, if the machine is marked „DL“ in the type designation, the motor is already switched to the lefthand drive.

The direction of rotation can be reversed by direct switching on by reversing two mains conductors on the terminal plate of the motor.



A change in direction of rotation is not permissible in the case of design with return stops or/and rotation-dependent fans.

For a machine with only one shaft end or two shaft ends of different thickness, the direction of rotation of the rotor, which an observer observes when looking at the end face of the single or thicker end of the shaft, is considered to be the rotational direction.



For each motor the correct connection diagram is attached. The connection must be done accordingly. For the connection of auxiliary circuits please see the additional connection diagram, which is also attached.

تهران، کیلومتر ۲۱ بزرگراه لشگری (جاده مخصوص کرج)

روبروی پالایشگاه نفت پارس، پلاک ۱۲

Hints for screwed cable glands that are admitted for explosion protection

The terminal boxes are designed as standard with metric threaded holes according to EN 50262 or on request with NPT-threaded holes according to ANSI B1.20.1-1983. At delivery the holes are closed with plugs or ATEX-certified cable glands. For connection of the motor only use cable entries that are designed according to directive 2014/34/EU (RL94/9/EC) and have at least IP 55 type of protection.

For motors in type of protection flameproof enclosure "t" (IP 6X necessary!) the cable entries and plugs must be designed according to directive 2014/34/EU (RL94/9/EC) (ATEX) and have at least IP 65 type of protection.



All unused cable entry points must be closed with plugs according to the minimum type of protection listed in directive 2014/34/EU (RL94/9/EC) (ATEX). Existing plugs must be checked accordingly and if necessary they have to be changed.

The specification of thread type is given on the equipment (name plate or terminal box). Alternatively the instruction about cable entry thread, number and position of cable entries can be given in the dimensional drawing of the motor. For explosion protected VEM-motors cable glands of the company Jacob are used, if not ordered otherwise. The following specifications must be observed for these special cable glands:

Ex-brass screw connection, metric thread, EC declaration of conformity DMT 99 ATEX E 016

Thread	Part-No.	For cable diameter [mm]	Width across flats [mm]	Installation torque [Nm]
M 12 x 1.5	50.612 M/EX	3...6	14	5
M 12 x 1.5	50.612 M1/EX	3...6.5	14	5
M 16 x 1.5	50.616 M/EX	5...9	17	5
M 20 x 1.5	50.620 M1/EX	6...12	22	7.5
M 20 x 1.5	50.620 M/EX	9...13	22	7.5
M 25 x 1.5	50.625 M/EX	11...16	27	10
M 32 x 1.5	50.632 M/EX	14...21	34	15
M 40 x 1.5	50.640 M/EX	19...27	43	20
M 50 x 1.5	50.650 M/EX	24...35	55	20
M 63 x 1.5	50.663 M/EX	32...42	65	20
M 63 x 1.5	50.663 M1/EX	40...48	65	20
M 75 x 1.5*)	HAWKE International	54.5...65.3	95	20
M 80 x 1.5*)	HAWKE International	67...73	106.4	20
M 90 x 1.5*)	HAWKE International	67...77.6	115	20
M 100 x 1.5*)	HAWKE International	75...91.6	127	20

*) Baseefa06ATEX0056X or IEC BAS 06.0013X.

Ex-EMC-brass screw connection, metric thread, EC declaration of conformity DMT 99 ATEX E 016

Thread	Part-No.	For cable diameter [mm]	Width across flats [mm]	Installation torque [Nm]
M 12 x 1.5	50.612 M/EMV/EX	3...6	14	5
M 12 x 1.5	50.612 M1/EMV/EX	3...6.5	14	5
M 16 x 1.5	50.616 M/EMV/EX	5...9	17	5
M 20 x 1.5	50.620 M1/EMV/EX	6...12	22	7.5
M 20 x 1.5	50.620 M/EMV/EX	9...13	22	7.5
M 25 x 1.5	50.625 M/EMV/EX	11...16	27	10
M 32 x 1.5	50.632 M/EMV/EX	14...21	34	15
M 40 x 1.5	50.640 M/EMV/EX	19...27	43	20
M 50 x 1.5	50.650 M/EMV/EX	24...35	55	20
M 63 x 1.5	50.663 M/EMV/EX	32...42	65	20
M 63 x 1.5	50.663 M1/EMV/EX	40...48	65	20
M 75 x 1.5*)	HAWKE International	54.5...65.3	95	20
M 80 x 1.5*)	HAWKE International	67...73	106.4	20
M 90 x 1.5*)	HAWKE International	67...77.6	115	20
M 100 x 1.5*)	HAWKE International	75...91.6	127	20

*) Baseefa06ATEX0056X or IEC BAS 06.0013X.

If screwed cable glands or plugs according to directive 2014/34/EU (RL94/9/EC) (ATEX) from other manu-

facturers are used please observe the corresponding manufacturers information.

EU Declaration of Conformity
(according to EU Directive 2014/34/EU)

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

VEM motors Thurm GmbH
Äußere Dresdner Straße 35
D-08066 Zwickau

Product description: Explosion-protected three-phase asynchronous motors with squirrel-cage rotor of the series (IE⁻)-K... / (IE⁻)-K8.. (Y2, Y3) / (IE⁻)-W... / (IE⁻)-B...
The additional mark in front of the series with IE * * = 1, 2, 3, 4 or as suffix Y2, Y3 indicates the energy efficiency class of the motors according to EN/IEC 60034-30-1

The object of the declaration described above is in conformity with the relevant Union harmonization legislation:

2014/34/EU Directive of the European Parliament and of the Council of 26th February 2014 on the harmonization of the laws of the Member States relating to equipment and protective systems intended for use in potentially explosive atmospheres (recast), Official Journal of the European Union L96/309-356 of 29.03.2014

2006/42/EG Directive of the European Parliament and of the Council of 17th May 2006 on machinery, and amending Directive 95/16/EC (recast), Official Journal of the European Union L157/24-86 of 09.06.2006

This declaration of conformity is issued under the sole responsibility of the manufacturer.
We confirm conformity of the product indicated above with the standards:

Reference number and date of issue

EN 60079-0:2012+A11:2013 [IEC 60079-0:2011, modified + Cor.:2012 + Cor.:2013]
EN 60079-1:2014 [IEC 60079-1:2014]
EN 60079-7:2015 [IEC 60079-7:2015]
EN 60079-15:2010 [IEC 60079-15:2010]
EN 60079-31:2014 [IEC 60079-31:2013]
EN 60034-1:2010+Cor.:2010 [IEC 60034-1:2010, modified]
with all relevant parts and supplements of EN 60034-.. [IEC 60034-..]

The motors for which an EC type examination certificate from a notified body or a type examination certificate of an independent test laboratory is available, but it is related to some older standard editions, than these motors also fulfil the basic requirements for security and health protection from directive 2014/34/EU (ATEX).

The designated product is intended for incorporation into a machinery, and it must not be put into operation until the relevant machinery into which the product has been incorporated has been declared being in conformity with the provisions of Directive 2006/42/EC.

The quality assurance systems of the manufacturers are certified by IBExU Institut für Sicherheitstechnik GmbH, notified body No. 0637 with approval no. IBExU17ATEXQ009 and IBExU17ATEXQ010.

Wernigerode, 2017-08-01

Zwickau, 2017-08-01



Lehmann
Managing director



Gruner
Managing director

This declaration confirms compliance with the above-mentioned directives but is not a guarantee of product liability.

EU Declaration of Conformity

(according to EU Directive 2014/34/EU)



Series (IE⁺-)K... / (IE⁺-)K8.. (Y2, Y3) / (IE⁺-)W... / (IE⁺-)B...

Description of equipment labeling

Equipment type IEC-size	EU	NB	Group/category/ G (Gas) or D (Dust)	Type of protection, temperature class, equipment protection level
(IE ⁺ -)K... 56 up to 400 (IE ⁺ -)W... 63 up to 400 (IE ⁺ -)B... 80 up to 400 (IE ⁺ -)K8.. 63 up to 450... (Y2, Y3)	CE	0637	II 2G	Ex db IIC T3...T6 or Ex db IIC T3...T6 Gb or Ex d IIC T3...T6 or Ex d IIC T3...T6 Gb
	CE	0637	II 2G	Ex db eb IIC T3...T6 or Ex db eb IIC T3...T6 Gb or Ex de IIC T3...T6 or Ex de IIC T3...T6 Gb
	CE	0637	II 2G	Ex db IIB+H2 T3...T6 or Ex db IIB+H2 T3...T6 Gb or Ex d IIB+H2 T3...T6 or Ex d IIB+H2 T3...T6 Gb
	CE	0637	II 2G	Ex db eb IIB+H2 T3...T6 or Ex db eb IIB+H2 T3...T6 Gb or Ex de IIB+H2 T3...T6 or Ex de IIB+H2 T3...T6 Gb
	CE		II 3G	Ex ec IIC T2, T3 or T4 Gc (Ex nA IIC T2, T3 or T4 Gc)
	CE	0637	II 2G	Ex eb IIC T1/T2, T3 or T4 Gb (Ex e IIC T1/T2, T3 or T4 Gb)
	CE		II 3D	Ex tc IIIB TX°C Dc or Ex tc IIIC TX°C Dc ¹⁾
	CE	0637	II 2D	Ex tb IIIC TX°C Db
	CE	0637	II 2G II 2D	Ex db IIC T3...T6 or Ex db IIC T3...T6 Gb or Ex d IIC T3...T6 or Ex d IIC T3...T6 Gb or optionally Ex tb IIIC T200 °C - T85°C Db
	CE	0637	II 2G II 2D	Ex db eb IIC T3...T6 or Ex db eb IIC T3...T6 Gb or Ex de IIC T3...T6 or Ex de IIC T3...T6 Gb or optionally Ex tb IIIC T200 °C - T85°C Db
	CE	0637	II 2G II 2D	Ex db IIB+H2 T3...T6 or Ex db IIB+H2 T3...T6 Gb or Ex d IIB+H2 T3...T6 or Ex d IIB+H2 T3...T6 Gb or optionally Ex tb IIIC TX°C Db
	CE	0637	II 2G II 2D	Ex db eb IIB+H2 T3...T6 or Ex db eb IIB+H2 T3...T6 Gb or Ex de IIB+H2 T3...T6 or Ex de IIB+H2 T3...T6 Gb or optionally Ex tb IIIC TX°C Db
	CE	0637	II 2G II 2D	Ex eb IIC T1/T2, T3 or T4 Gb (Ex e IIC T1/T2, T3 or T4) or optionally Ex tb IIIC TX°C Db
	CE	0637	II 2G II 3D	Ex eb IIC T1/T2, T3 or T4 Gb (Ex e IIC T1/T2, T3 or T4 Gc) or optionally Ex tc IIIB TX°C Dc or Ex tc IIIC TX°C Dc ¹⁾
	CE	0637	II 2D II 3G	Ex tb IIIC TX°C Db or optionally Ex ec IIC T2, T3 or T4 Gc (Ex nA IIC T2, T3 or T4 Gc)
	CE		II 3G II 3D	Ex ec IIC T2, T3 or T4 Gc (Ex nA IIC T2, T3 or T4 Gc) or optionally Ex tc IIIB TX°C Dc or Ex tc IIIC TX°C Dc ¹⁾

²⁾ conductive dust

NB 0637 ... IBExU Institut für Sicherheitstechnik GmbH
Fuchsmühlenweg 7
09599 Freiberg (Germany)



ELECTRIC DRIVES

FOR EVERY DEMAND

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