



ELECTRIC DRIVES

FOR EVERY DEMAND

Supplementary
assembly, operating and maintenance instructions

Explosion-proof three-phase asynchronous motors with squirrel-cage rotor for high voltage

Ignition protection types
Increased safety “eb” and “ec”
Protection by enclosure “t”

Series W52R 355 ... to W52R 450 ..

Translation of original German



ATEX



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1. Safety and commissioning instructions

1.1 General



Attention: Read installation, operation and maintenance documents (BUW), terminal diagram, additional terminal diagram and safety data sheet before transport, installation, commissioning, maintenance and repair, and observe the instructions!

These supplementary operating and maintenance instructions apply together with the operating and maintenance instructions for standard motors, which contain the basic specifications for connection, assembly, operation and maintenance, the spare parts lists and the documents previously specified.

This BUW is intended to help the operator to transport, install, commission and maintain the explosion-proof electrical machine safely and properly.

Neither compliance with this manual nor the conditions and methods of installation, operation, use and maintenance of the electric motor can be monitored by the manufacturer. Improper installation can cause damage to property and consequently endanger personnel. We cannot therefore accept any responsibility or liability for loss, damage or costs arising from or in any way connected with incorrect installation and improper operation, use or maintenance.

Drawings and illustrations are simplified representations. Due to improvements and modifications, it is possible that they do not correspond in detail to the electrical machine supplied. We are constantly striving to improve our products. We therefore reserve the right to make changes to the product, the technical data or the assembly, operating and maintenance instructions without prior notice. Designs, technical data and illustrations are only ever binding with written confirmation from the supplier.

1.2 Symbols

Three symbols are used in this operating manual to indicate particularly important passages:



Safety and warranty information, including possible personal injury.



Warns of electrical voltage, danger to life. Indicates that damage can be caused to the electrical machine and/or the auxiliary equipment.



Ex additional information for electrical machines of equipment group II for category 2 (zones 1 and 21) or equipment group II for category 3 (zones 2 and 22).

1.3 Safety regulations

The safety regulations, accident prevention rules, guidelines and recognized rules of technology must be observed without fail!

Failure to observe the safety instructions can result in danger to persons and/or damage to the machine. High-voltage machines > 1kV have dangerous, live and rotating parts, and possibly hot surfaces. All work relating to transport, connection, commissioning and maintenance must be carried out exclusively by qualified, responsible technical personnel (observe EN 50 110-1)



Improper conduct can cause serious personal injury and material damage. Caution: Danger to life!

1.4 Intended use

These high voltage machines are intended for industrial plants. They comply with the harmonised standards of the IEC/EN 60034 and IEC/EN 60079 series.

For use in ex areas, the additional instructions for the ignition protection type must be observed. The motors are designed as standard for ambient temperatures from -20°C to +40°C and installation altitudes of ≤ 1000 m above sea level.



The conditions at the place of installation must correspond to all the rating plate specifications

General standards applied

Feature	Standard
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Dimensioning and operating behaviour	IEC 60034-1	EN 60034-1
Method for determining the losses and efficiency of rotating electrical machines and tests	IEC 60034-2-1 IEC 60034-2-2 IEC 60034-2-3	EN 60034-2-1 EN 60034-2-2 EN 61800-9-2
Protection class	IEC 60034-5	EN 60034-5
Cooling	IEC 60034-6	EN 60034-6
Types of construction	IEC 60034-7	EN 60034-7
Connection designations and direction of rotation	IEC 60034-8	EN 60034-8
Noise emissions	IEC 60034-9	EN 60034-9
Starting behaviour, rotating electrical machines	IEC 60034-12	EN 60034-12
Vibration severity levels	IEC 60034-14	EN IEC 60034-14
Efficiency classification of three-phase motors with squirrel cage rotors	IEC 60034-30	EN 60034-30-1
IEC standard voltages	IEC 60038	EN 60038

Supplementary standards for explosion-proof machines

Feature	Standard	
Electrical apparatus for explosive gas atmospheres - Part 0: General requirements	IEC 60079-0	EN IEC 60079-0
Electrical apparatus for explosive gas atmospheres - Part 1: Flameproof enclosures "d"	IEC 60079-1	EN 60079-1
Electrical apparatus for explosive gas atmospheres - Part 7: Increased safety "e"	IEC 60079-7	EN IEC 60079-7
Electrical apparatus for explosive gas atmospheres - Part 14: Electrical installations for hazardous areas (excluding mines)	IEC 60079-14	EN 60079-14
Electrical apparatus for use in the presence of combustible dust - Part 17: Electrical installations inspection and maintenance (excluding mines)	IEC 60079-17	EN IEC 60079-17
Electrical apparatus for explosive gas atmospheres - Part 19: Equipment repair, overhaul and reclamation	IEC 60079-19	EN 60079-19
Potentially explosive atmosphere - Part 31: Equipment dust ignition protection by enclosure "t"	IEC 60079-31	EN 60079-31

High-voltage machines are components for installation in machines as defined in the Machinery Directive 2006/42/EC. Commissioning is prohibited until the conformity of the end product with this Directive has been established (the relevant local safety and installation regulations, e.g. EN 60204, must be observed). These supplementary operating instructions apply to explosion-proof, surface-cooled electrical machines for high voltage. The protection class according to IEC/EN 60034-5 for motors used in zones 1, 2 and 22 is a minimum of IP 55. For use in zone 21, the motors are designed to meet IP 65 as a minimum. Only electrical machines with the approved type of ignition protection may be used in hazardous areas.



Electrical machines of equipment group II, category 2 (assigned zones 1 and 21) or equipment group II, category 3 (assigned zones 2 and 22)

Any other or further use is deemed to be improper.

No liability can be accepted for damage or operational malfunctions resulting from assembly errors, failure to observe these instructions or improper repairs.

1.5 Potentially explosive atmospheres

Which areas outdoors or in enclosed spaces are to be regarded as potentially explosive within the meaning of the relevant ordinances and regulations must be determined exclusively by the plant operator or, if there is any doubt about the definition of potentially explosive atmospheres, by the competent supervisory authority. The responsibilities of the plant operator are defined in Directive 99/92/EC - ATEX 153 "Occupational Health

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and Safety Directive" (formerly ATEX 118a or 137).

The basis for explosion-proof products is Directive 2014/34/EU. This specifies the requirements of products for use in potentially explosive atmospheres. These are supported by corresponding standards (see below). Explosion-protected electrical machines to which these instructions apply must be constructed in accordance with the standards of IEC/EN 60034 (VDE 0530), IEC/EN 60079-0 and the standards IEC/EN 60079-7 and IEC/EN 60079-31 valid for the corresponding ignition protection type. They may only be put into operation in potentially explosive atmospheres in accordance with the regulations of the responsible supervisory authority.



Ignition protection type, temperature class and characteristics are shown on the motor rating plate.

Device group II, category 2, assigned zones: 1

This category includes electrical machines of the ignition protection type increased safety "eb"

Device group II, category 3, assigned zones: 2

This category includes electrical machines of the ignition protection type increased safety "ec"

Device group II, category 2, assigned zone: 21

This category includes electrical machines of the ignition protection types protection by enclosure "tb"

Device group II, category 3, assigned zone: 22

This category includes electrical machines of the ignition protection types protection by enclosure "tc"



If the certificate number ends in an X, special conditions in the attached EU(EC) Type Examination Certificate must be observed.

1.6 Transport and storage

Any damage detected on delivery must be reported to the transport company immediately; if necessary, commissioning must be prevented.

Transport eyes (attachment points) are of an appropriate size for the weight of the high-voltage machine. No additional loads may be attached. If necessary, suitable, adequately sized transport equipment (e.g. rope guides) must be used. Existing transport safety devices must be removed before commissioning. They must be reused for further transport.

If high-voltage machines are stored, a dry, dust-free, low-vibration ($v_{eff} \leq 0.2 \text{ mm/s}$) environment must be provided. Otherwise bearing damage due to standstill may occur.

The insulation resistance must be measured before commissioning. For values $\leq 15 \cdot U_N [\text{kV}] [\text{M}\Omega]$ at 20°C winding temperature the winding must be dried. Further instructions in the section "Storage regulations" must be observed.

1.7 Installation, electrical connection and commissioning

The safety instructions enclosed with the motor must be observed during assembly and commissioning. Assembly work may only be carried out by qualified personnel who, on the basis of their technical training, experience and instruction, have sufficient knowledge of



- safety regulations,
- accident prevention regulations,
- guidelines and recognised rules of technology (e.g. VDE regulations, standards).

In Germany, installation of electrical systems in potentially explosive atmospheres requires the following regulations to be observed:



- BetrSichV "Industrial Safety Regulation",
- TRBS "Technical Rules for Operational Safety"
- GefStoffV "Hazardous Substances Ordinance"
- IEC/EN 60079-14 "Explosive atmospheres - Part 14: Electrical installations design, selection and erection"

Outside Germany, the relevant national regulations must be observed!

The technical personnel must be able to assess the work assigned to them, recognise possible dangers and

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avoid them. They must be authorised by the person responsible for the safety of the installation to carry out the necessary work and activities. Before starting work, the following 5 safety rules must always be applied:

- Disconnect
- Secure to prevent restarting
- Ensure absence of voltage
- Ground and short circuit
- Cover or cordon off adjacent live parts

Auxiliary circuits (e.g. standstill heating) must also be disconnected.

Exceeding the limit values of area A in IEC/EN 60034-1/ DIN VDE 0530 -1 – voltage $\pm 5\%$, frequency $\pm 2\%$, waveform, symmetry – leads to increased heating. Observe the information on the rating plate and the wiring diagram in the terminal box. The connection must be made in such a way that a permanently safe electrical connection is maintained. Only approved cable end fittings must be used. Safe equipotential bonding must be established and ensured.

Air gaps between bare, live parts and to earth must not fall below the following values:

- 36 mm for $U_N \leq 3.2$ kV,
- 60 mm for $U_N \leq 6.3$ kV

The working voltage may exceed the specified voltage level by 10%.

There must be no foreign bodies, dirt or moisture in the terminal box.

For a test run without output elements, the feather key must be secured.

High-voltage machines with accessories must be checked for proper function before commissioning.

Proper installation (e.g. spatial separation of signal lines and power cables, shielded lines and cables, etc.) is the responsibility of the system operator.



Unventilated motors without integral fans are cooled by free convection with cooling fins on the motor housing. Adequate safety to prevent inadmissible heating is ensured by power reduction/winding adjustment and proven by means of type testing/submission. Free convection must be ensured to maintain the temperature class and the permissible operating temperature. The motor must not be enclosed.

Compare current type, mains voltage and frequency!

Pay attention to the circuitry!

Observe rated current for circuit breaker setting!

For motors in ignition protection type increased safety “e” the t_E time must be observed!

Connect the motor according to the terminal diagram provided in the terminal box!



For earthing, there is an earth terminal on the housing or on the flanged bearing plate, depending on the design. All motors also have a protective conductor terminal inside the terminal box. Unused cable glands in the terminal box must be closed to protect against dust and moisture. General safety and commissioning instructions apply to electrical connection. The cable glands and connection screws must be approved for Ex atmospheres. The installation torques, sealing ranges and clamping ranges for strain relief specified by the gland manufacturer must always be observed. Connecting cables must be selected in accordance with DIN VDE 0100, taking into account the rated current and system-dependent conditions (e.g. ambient temperature, type of installation, etc. in accordance with DIN VDE 0298 or IEC/EN 60204-1).



At room temperatures of more than 40°C, cables with a permissible operating temperature of at least 90°C must be used. This also applies to motors for which the data sheet/supplement to the EU (EC) Type Examination Certificate refers to special requirements for cable design.

When connecting motors, special care must be taken to ensure that the connections in the terminal box are made correctly. The nuts on the connection screws must be tightened without exerting force.

Creepage and clearance distances according to IEC/EN 60079-0/60079-7 must be observed.

Tightening torques for production and testing Screw connections ungreased								
Dimensions	Bolt connections Cu / Ms		Strength 4.6 and 5.6 or screws made of Cu, Ms, Al, GG		Strength 8.8 - Mech. without lock - Busbars with lock		Strength 8.8 - Mech. with lock	
	Manufacturing [Nm]	Testing [Nm]	Manufacturing [Nm]	Testing [Nm]	Manufacturing [Nm]	Testing [Nm]	Manufacturing [Nm]	Testing [Nm]

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M4	1.0	0.7	1.4	1.0	3.0	2.6	3.3	2.8
M5	2.0	1.4	2.7	1.9	5.9	5.0	6.7	5.7
M6	3.5	2.5	4.6	3.2	10	8.5	11.5	9.8
M8	8.4	5.9	11	7.7	25	21.3	27	23.0
M10	13.2	9.2	17.1	12.0	38.1	32.4	54	45.9
M12	22.6	15.8	30.3	21.2	66.1	56.2	92	78.2
M14	—	—	48.2	33.7	105	89.3	145	123.3
M16	55.2	38.6	73.9	51.7	163	138.6	225	191.3
M18	—	—	101	70.7	233	198.0	320	272
M20	107	74.9	143	100.1	331	281.4	460	391
M22	-	-	194	136	451	383	620	527
M24	183	128	245	172	568	483	790	672
M27	-	-	366	256	856	728	1160	986
M30	369	258	494	346	1130	961	1550	1320
M33	502	385	673	471	1560	1330	-	-
M36	840	588	1120	784	2 020	1720	-	-
M39	-	-	1380	966	2 640	2 240	-	-
M42	-	-	1370	959	3 230	2 750	-	-
M45	-	-	1700	1190	3 990	3 390	-	-
M48	-	-	2 050	1440	4 860	4 130	-	-
M52	-	-	2 630	1840	6 200	5 270	-	-
M56	-	-	3 280	2 300	7 750	6 590	-	-
M64	-	-	4 890	3 420	11600	9860	-	-
M68	-	-	5 890	4 120	13800	11700	-	-

Tightening torques of screw connections

When inserting the supply cables into the terminal box, make sure that the cables have strain relief. The inside of the terminal boxes must be kept clean. The seals must be undamaged and correctly seated. The terminal box must always be closed during operation.

High-voltage terminal boxes have a pressure relief flap with predetermined breaking point (at the bottom of the terminal box). The flap and seal must not be damaged during connection. The protection class must be ensured. In case of damage, the seal can only be restored with the original sealing material.

The connection terminals for additional devices and monitoring equipment are located in the auxiliary terminal box.



ATTENTION!

Observe the following minimum values for distances between bare live components and to ground:

Nominal voltage U_N	[kV]	3	3.3	6	6.6
Minimum distance	[mm]	36	36	60	60

The cable lugs, nuts and locknuts must be arranged according to the illustrations under section 20 Terminal box assembly.

Rated voltage	Bolt	Bolt material	Rated current	Protection class	Terminal	Cable lug	Connection cross-section
			[A]				[mm ²]
max. 6 kV	M12	MS	250	IP 55	DIN46264-6-M12-Ms	DIN46234	min. 70 mm ² max. 240 mm ²
	M16	MS	315		DIN46264-6-M16-Ms		
	M16	Bz	400				

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Tightening torques for screws on terminal box, bearing plates and bearing cover

Thread Ø	M8	M10	M12	M16	M20	M24
Load blocks	-	-	-	150	250	400
Bearing plates	25	45	75	170	275	-
Bearing cover	15	20	20	-	-	-
Terminal box	7.5	12.5	-	20	-	-

Terminal board circuits



In standard design, the surface-cooled motors are suitable for both directions of rotation. An exception is the 2-pole types. They are equipped as standard with a fan with a specific direction of rotation. When using fans with a specific direction of rotation, a direction of rotation arrow is provided on the fan guard.

The terminals U1, V1, W1 on phases L1, L2, L3 (in alphabetical or natural sequence) always result in clockwise rotation. The direction of rotation can be reversed for direct switch-on by swapping two mains conductors on the motor terminal plate. For a machine with only one shaft end or two shaft ends of different thickness, the direction of rotation is the direction of rotation of the rotor that an observer sees when looking at the front of the single or thicker shaft end.



Each motor is supplied with a binding terminal diagram according to which the connections must be made. The auxiliary circuits must be connected according to the additional terminal diagram also enclosed.

1.8 Operation

Vibration severities in the range “satisfactory” ($V_{\text{eff}} \leq 4.5$ mm/s) according to ISO 10816-1 are not a cause for concern in coupled operation. If there are changes compared to normal operation, e.g. increased temperatures, noises and vibrations, the machine must be switched off in case of doubt.

The cause must be determined and the manufacturer consulted if necessary. Protective devices must not be disabled even in test runs.

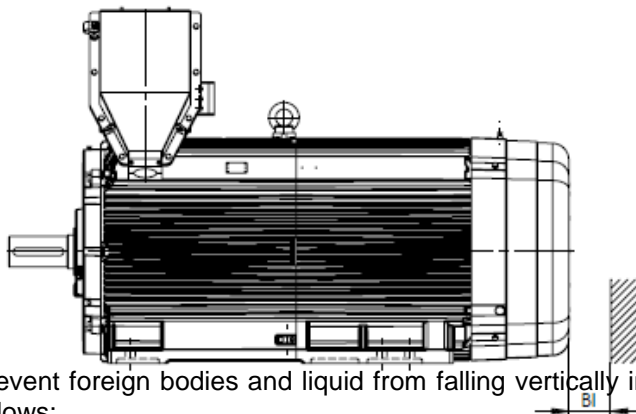
The closed condensation water drain holes provided must be opened from time to time. Roller bearings with relubricating devices must be regreased when the high-voltage machine is running. The lubrication information on the rating plate must be observed.

1.9 Environmental factors

The permissible coolant temperature (room temperature at the installation site) according to IEC/EN 60034-1 is a maximum of 40°C/minimum -20°C without marking and the permissible installation altitude is up to 1000 m above sea level (other values are indicated on the motor rating plate and certified separately, as necessary). It must be ensured that the cooling air can flow freely into the air inlet openings and out through the air outlet openings and cannot be drawn in again directly.

Suction and discharge openings must be protected against contamination and coarse dust. Direct intake of exhaust air from neighbouring units must be prevented by suitable measures.

The minimum distance between the air inlet on the fan guard and an obstacle (dimension BI) must be observed.



Size	BI [mm]
355	110
400	110
450	110

Prevent foreign bodies and liquid from falling vertically into the fan for motors with vertical shaft position as follows:

Shaft end down:

The fan guard is provided with a protective roof (delivery condition) which is larger than the circumference of the air inlet openings.

Alternatively, the operator must take suitable measures to prevent foreign bodies and water from falling into the fan

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Shaft end upwards:

For designs with the shaft at the top, the operator must prevent foreign bodies and water from falling vertically into the shaft. With the shaft end upwards, ingress of water or liquid along the shaft must also be prevented. When installing surface-cooled motors, it must also be ensured that the condensation water drain holes are located at the lowest point. If the condensation water drain holes are sealed, sealant must be applied to the screws when they are replaced after draining the condensation water. In the case of open condensation water holes, direct exposure to water jets or splash water must be avoided. Careful installation of the motors on a completely level surface is essential to avoid distortion when tightening them. Precise alignment of any machines to be connected must be ensured. If possible, flexible couplings should be used.

1.10 General information on operation from the frequency inverter

Operation of explosion-proof three-phase motors from the frequency inverter is only permitted if the motors are manufactured, tested, approved and separately marked for this type of operation. The separate manufacturer's instructions must be observed.

For the ignition protection type increased safety "eb" and motors for use in zone 21, separate EU (EC) Type Examination Certificates are required in which operation with the inverter is explicitly approved and in which the conditions to be observed and parameter settings of the system motor, inverter and protective device are specified.

In ignition protection type "ec", motors supplied with power by converters with variable frequency and/or voltage must also be tested with the specified converter or a converter that is comparable in terms of output voltage and current. Alternatively, the temperature class can be determined by calculation. The necessary parameters and conditions can be found on the rating plate or in the motor documentation.

To avoid impermissible temperatures, the motors are always equipped with thermal winding protection, which must be checked with a suitable device. The motors must not be operated as group drives.

For installation and commissioning of the frequency inverter, the manufacturer's instructions and operating manual must be observed.

Operation from the frequency inverter for use in zone 2, 22 (Ex II 3G, Ex II 3D)

Operation with the frequency inverter is only permitted within the operating points specified on the rating plate. Exceeding the rated current for the machine by up to 1.5 times that rated current is permissible for a maximum of 1 minute within a period of 10 minutes. The specified maximum speed or frequency must never be exceeded. By selecting the appropriate inverter and/or using filters, it must be ensured that the maximum permissible pulse voltage at the motor terminals is not exceeded.

It must be ensured that the operating voltage applied to the motor terminals always corresponds to the information on the rating plate (note voltage drop across filter!). The thermal winding protection must be checked either by a separate trigger device or by the inverter.

Operation from the frequency inverter for use in zone 1, 21 (Ex II 2G, Ex II 2D)

Motors for use in zone 1 or 21 must always be certified by an authorised body for operation with a frequency inverter. Limit values specified on the rating plate and on the EC Type Examination Certificate must be strictly observed. In particular, this also means monitoring the continuous current as a function of frequency. Only frequency inverters that meet the requirements specified on the EU (EC) Type Examination Certificate may be used. Assessment of the integrated thermal winding protection must be carried out using a trigger unit with the Ex-marking II (2) G which complies with the requirements of Directive 2014/34/EU. The specified maximum speed or frequency must never be exceeded. It must be ensured that the operating voltage applied to the motor terminals always corresponds to the information on the rating plate (note voltage drop across filter!). If the terminal voltage at the motor is lower than the rated voltage specified on the rating plate due to voltage drops across the frequency inverter, the cables and any chokes or filters, the base frequency must be set to a lower value corresponding to a linear voltage/frequency assignment. This results in a smaller speed control range.

1.11 Electromagnetic compatibility

When operating the motors from the frequency inverter, interference emissions can occur depending on the inverter type. Exceeding the limit values according to IEC/EN 61000-6-3 must be avoided for the drive system consisting of motor and inverter. The EMC instructions of the inverter manufacturer must always be observed. On machines with built-in PTC thermistors or other sensors, inverter-induced interference voltages can occur.

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2. Information about ignition protection type increased safety “eb”

2.1 Protective principle/labelling

Ignition protection type in which additional measures are taken to prevent the possibility of impermissibly high temperatures and the occurrence of sparks or arcs during normal operation or under specified exceptional conditions with an increased degree of safety.

- Prevention of sparks and other ignition sources
- Enclosure at least IP54 for bare, live parts inside
- Enclosures at least IP44 if all live parts inside are insulated
- Observance of creepage and clearance distances
- Special attention to insulation materials and seals
- Temperatures of the outer and inner surfaces must be lower than the ignition temperature both in normal operation and in the event of a fault (motor stalling)
- Protection devices (temperature monitoring and/or overcurrent switch with I_A/I_N -tE time characteristic) required for the user
- Frequency inverter operation see section 3


Tests:

- Insulation test
- Temperature measurement for defined faults
- Additional tests for certain equipment (TMS full protection)

Areas of application:

Equipment zone 1 and 2, category 2G and 3G (Gb,Gc)

Marking of the motors with EC Type Examination Certificate according to Directive 2014/34/EU (94/9/EC):

CE 0637  II 2 G Ex eb IIC T1/T2 or T3 Gb
QA certification by NB 0637 ... IBEExU Freiberg

For explosion-proof motors in ignition protection type increased safety “eb” according to IEC/EN 60079–0 and IEC/EN 60079–7, the following points must be observed in particular:

The greater danger in potentially explosive atmospheres requires particularly careful attention to the safety and commissioning instructions. Explosion-proof motors may only be used in potentially explosive atmospheres in accordance with the regulations of the responsible supervisory authority. It is responsible for determining the explosion risk and zone classification. Ignition protection type, temperature class and special requirements are stated on the rating plate or on the EC Type Examination Certificate. If the certificate number ends in an X, special conditions on the EC Type Examination Certificate must be observed. Electrical machines fall into this category, e.g. also those with ignition protection type increased safety “eb” for inverter operation.

2.2 Information about impermissible heating

Unless otherwise stated on the test certificate or the rating plate in connection with operating mode and tolerances, electrical machines are designed for continuous operation and normal, not frequently recurring starts during which no significant start-up heating occurs. The motors may only be used for the operating mode indicated on the rating plate. If the operating mode is not indicated on the rating plate, the motors may only be operated in continuous operation, S1.

The voltage and frequency limits of area A in IEC/EN 60034-1 (DIN VDE 0530, part 1) – voltage $\pm 5\%$, frequency $\pm 2\%$, curve shape, mains symmetry – must be observed so that heating remains within the permissible limits. Larger deviations from the rated values can increase the heating of the electrical machine inadmissibly and must be indicated on the rating plate. The motor must be protected against impermissible heating during start-up, e.g. with a motor protection switch, i.e. impermissible heating must be prevented in all phases by a current-dependent delayed circuit breaker according to DIN VDE 0660 or an equivalent device. The protective device must be set to the rated current. Windings in delta circuits must be protected in such a way that the triggers or relays are connected in series with the winding strands. Selection and setting of the triggers is based on the rated value of the strand current, i.e. 0.58 times the rated motor current. If a circuit of this sort is not possible, suitable circuit breakers, e.g. with phase failure monitoring, must be used. For pole-changing motors, current-dependent delayed triggers or relays must be provided for each speed level and must be locked out from each other.



With ignition protection type increased safety “eb”, the start-up is also monitored. The protective device must therefore switch off within the t_E time specified for the respective temperature class if the rotor is blocked. The requirement is met if the tripping time - which can be taken from the tripping

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characteristic curve (initial temperature 20°C) for the ratio I_A/I_N - is not longer than the specified t_E time.

Electrical machines with ignition protection type increased safety "eb" for heavy starting (starting time $> 1.7 \times t_E$ time) must be protected by a start-up monitoring system in accordance with the information on the Declaration of Conformity and must be explicitly certified for this application.



Thermal machine protection by direct temperature monitoring of the winding is permissible if this is certified and the t_A time is indicated on the rating plate. The Ex-protection is guaranteed by temperature sensors according to DIN VDE V 0898-1-401 in combination with trigger devices with protection type identification (Ex) G. For pole-changing motors, separate protective devices locked out from each other are required for each speed level.

2.3 Risk assessment for electrical machines of ignition protection type increased safety "eb" Ignition risk on stator windings

The stator windings are designed and manufactured using an insulation system tested according to IEC/EN 60079-7:2015 section 6.2.3.1. No further measures are therefore necessary if the sum of the factors is less than or equal to 6 for the risk assessment with regard to possible discharges at stator windings in accordance with EN 60079-7, Annex G.



If the sum of the factors is greater than 6, the machine must be pre-purged before starting. The machine is prepared accordingly.
See annex "Pre-purge before start-up"

Ignition risk in the air gap with squirrel cage rotors



A risk assessment has been carried out by the manufacturer regarding possible sparking in the air gap of squirrel cage rotors. If the sum of the factors is greater than 6 for the risk assessment for squirrel-cage rotors according to IEC/EN 60079-7:2015, the machine must be pre-purged before starting. The electrical machine is prepared accordingly and is provided with an additional label. Additional sign: Pre-purge required before start-up. See annex "Pre-purge before start-up"

In order to draw the attention of the operator to the special measures required to avoid sparking based on the risk assessment, the machine marking has an "X" at the end (as per IEC/EN 60079-0, section 29.3.e)

3. Information about ignition protection type increased safety "ec"

3.1 Protective principle/labelling

Ignition protection type for electrical equipment in which the equipment is not capable of igniting a surrounding explosive atmosphere in normal operation. The design ensures that the risk of arcs or sparks that could cause an ignition hazard during normal use is minimised.

- Prevention of sparks and other ignition sources
- Enclosure at least IP54
- Observance of creepage and clearance distances
- Special attention to insulation materials and seals

Temperatures of the outer and inner surfaces must be lower than the ignition temperature during normal operation

Tests:

- Insulation test
- Temperature measurement
- Additional tests for certain equipment (FI operation)

Areas of application:

Equipment zone 2, category 3G (Gc)

Marking of the motors with EC Type Examination Certificate according to Directive 2014/34/EU:



II 3 G Ex ec IIC T1/T2 or T3 Gc

The instructions given under 2.2 and 2.3 also apply in full to the ignition protection type increased safety "ec".

3.2 Risk assessment with regard to possible spark formation with electrical machines in ignition protection type increased safety "ec"

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Risk of ignition at the stator

The same criteria apply as for ignition protection type “eb”. We advise the plant operator to carry out the risk assessment (according to IEC/EN60079-7, Annex G) before commissioning, as changes to operating conditions compared to the design or order cannot be excluded.

Ignition risk in the air gap with squirrel cage rotors



Machines with an operating mode other than S1 or S2 and with a rated power in excess of 100 kW must undergo a risk assessment in accordance with EN 60079-15 with regard to possible sparking in the air gap. This risk assessment has already been carried out by the manufacturer.

If the sum of the factors is greater than 6 for the risk assessment for squirrel-cage rotors according to EN 60079-7:2015, Table 5, the machine must be pre-purged before starting. The electrical machine is prepared accordingly and is provided with an additional sign.

Additional sign: Pre-purge required before start-up. See annex “Pre-purge before start-up”

In order to draw the attention of the operator to the special measures required to avoid sparking based on the risk assessment, the machine label ends in an “X” as per IEC/EN 60079-0.

4. Information about ignition protection type protection by enclosure “t”

Protective principle/labelling

The temperatures of surfaces on which dust may be deposited or which may come into contact with a cloud of dust are kept below the temperatures specified in this standard. All parts with electrical sparks or temperatures above the limits specified in IEC/EN 60079-31 are encased in an enclosure that adequately prevents ingress of dust.

Procedure A: Compliance with specified protection types

Procedure B: Minimum gap lengths and maximum gap widths

- Prevention of sparks and other ignition sources
- Enclosure minimum protection types for procedure A:
Use in zone 21 and zone 22 with conductive dust: IP65
Use in zone 22 with non-conductive dust: IP55
- Observance of creepage and clearance distances
- Special attention to insulation materials and seals

Temperatures of the outer surfaces must be lower than the limit values during normal operation

Areas of application:

Equipment zone 21 and 22, category 2D and 3D (Db, Dc)

Ignition protection type protection by enclosure “tx IIY Dx”

Labelling of the motors according to Directive 2014/34/EU:

Use in zone 22



II 3D Ex tc IIIB T125°C Dc or for conductive dust



II 3D Ex tc IIIC T125°C Dc

Use in zone 21



II 2D Ex tb IIIC T125°C Db

Protective principle:

Dangerous enclosures are encased in an enclosure that is not susceptible to faults.

Proof of the max. surface temperature according to category.

Minimum protection type IP 5X/6X (IEC/EN 60529)

Pressure test before the dust test with an overpressure of

- 2 kPa for devices with protection level “tb” or “tc”

Limitation of the assumed short circuit current 10kA for EPL Da

Temperature limitation depending on EPL

Group classification

- IIIA, combustible fluff
- IIIB, non-conductive dust
- IIIC, conductive dust

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Protection against dust ingress according to Table 1, IEC/EN 60079-31

Group	Level of protection	Enclosure - level of protection
III A (fluff, fibres)	ta	IP6X
	tb	IP5X
	tc	IP5X
III B (non-conductive dust)	ta	IP6X
	tb	IP6X
	tc	IP5X
III C (conductive dust)	ta	IP6X
	tb	IP6X
	tc	IP6X

5. Product description

5.1 Structural design

Three-phase asynchronous motors with squirrel-cage rotor of the W52. series are surface-cooled motors (finned cooling) and are manufactured with shaft heights of 355, 400 and 450 mm. The basic version of the motors is designed with cooling type IC 411 and protection class IP 55.

Other cooling types, e.g. IC 416 (forced ventilation), IC 410 (non-ventilated) and IC 31W (water-jacket cooled), and protection classes (e.g. IP 56 or IP 65) are available as special versions. The horizontal types IM 1001 (IM B3) IM 2001 (IM B35) and the vertical type IM 3011 (IM V1) are standard. Special designs are available on request. Please refer to the rating plate or the data sheets in the electronic catalogue for the data applicable to your motor.

The motors have the following main assemblies:

- Stator housing with laminated core and winding
- Bearing plates with bearings
- Rotor with die-cast winding
- Fan with fan guard (sheet steel version)
- Terminal box /optional star point box

The stator housing with feet is made of grey cast iron, the bearing plates and terminal box are made of grey cast iron. For high-voltage motors, a welded steel construction is used for the terminal box. The hood for covering the fan on the N side is made of sheet steel or glass-fibre-reinforced plastic. The terminal box can be designed as standard with the arrangement top/straight, top/slant right and top/slant left. Subsequent relocation is not possible with these terminal boxes. Marked earthing points are located in the terminal box and on the stator housing.

5.2 Storage

The motors are of horizontal design and the basic "light bearing" version is fitted with deep groove ball bearings at the D and N ends, while the "heavy bearing" version is fitted with cylindrical roller bearings at the D end. For other designs, a different bearing arrangement may be used. All bearings are dust-tight and equipped with a relubrication device and grease quantity regulator. The detailed data for the motor is given on the rating plate.

5.3 Cooling system

The motors are surface-ventilated (cooling method IC 411 according to IEC 60034). The heat exchange takes place via the laminated stator core through to the finned housing and from size 355MX also upwards via an internal air circuit, which transfers part of the heat loss to hollow fins, which are designed as cooling channels. The motors have external and internal fans. With forced ventilation (cooling type IC 416), the external fan is not required. The air for surface cooling is drawn in by the forced ventilation fan installed in the sheet steel hood.

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5.4 Stator housing

The stator housings are made of grey cast iron EN GJL-200 DIN EN 1561 with horizontal-vertical cooling fins. The minimum wall thickness of the housing jacket outside the centring rim of 9 mm is maintained and increases towards the core. The strength of the housing construction has been verified using sample types in an impact test according to DIN EN 60079-0 for Group II with the mechanical hazard level "high" (test report 03/2014 dated 15.04.2014).

For fixing of the terminal box and terminal base, a surface with a corresponding opening to the interior of the housing is cast on the housing.

5.5 Stator winding

The winding and insulation design for machines of ignition protection types increased safety "eb" and "ec" corresponds to an insulation type tested according to EN 60079-7:2015 section 6.2.3.1 for equipment group IIC, or the ignition protection type protection by enclosure "tb" for equipment group IIC. The minimum air gap between the winding head and the enclosure or other grounded parts is at least 15 mm.

5.6 Terminal box, star point box

Terminal boxes are used which have a separate test report in accordance with Directive 2014/34/EU .

5.7 Entry parts

To insert the connection cables, cable glands (or screw plugs) according to 2014/34/EU are used in the cover plate with a minimum protection class of IP65.

If the terminal boxes are supplied with an undrilled cable entry plate, make sure that only cable entries are used

- which are suitable in their design and dimensions for the connecting cables
- which correspond to the protection class of the terminal boxes
- which have an ignition protection type approved for the zone and the associated ATEX conformity certificate

Drill threaded holes in the plate to match the screw size.

When using screw connections with metric threads, through holes can also be used. The screw connections must then be assembled with locking nuts, taking into account the thickness of the plate. The diameter of these through holes must be selected in accordance with

DIN EN 50262.

5.8 Standstill heating

In accordance with EN 60079-7, section 5.2.7, the motors are equipped with a standstill heating system as standard. The heating cables must comply with the requirements of Directive 2014/34/EU. The heating capacity and supply voltage are indicated on the motor rating plate. Appropriate terminals for auxiliary circuits are provided to connect them in additional terminal boxes that meet the requirements of Directive 2014/34/EU. They are connected according to the enclosed terminal diagram. The standstill heating is only to be switched on after the motor has been switched off. It must not be switched on during motor operation.

6. Additional equipment

Explosion-proof motors can be equipped with additional optional equipment that meets the requirements of Directive 2014/34/EU:

6.1 Additional thermal motor protection

For monitoring the stator winding temperature, temperature sensors (PT100) which meet the requirements of Directive 2014/34/EU are installed in the motor. Appropriate terminals for auxiliary circuits are provided to connect them in additional terminal boxes that meet the requirements of Directive 2014/34/EU. They are used to make the connection according to the enclosed terminal diagram.

6.2 Forced ventilation unit

The forced cooling fans must meet the requirements of Directive 2014/34/EU. The forced ventilation unit ensures dissipation of the heat lost during operation of the main motor. During operation of the main motor, the forced ventilation motor must be switched on.

For motors with forced ventilation units that depend on direction of rotation, the direction of rotation must be observed. (See rotation direction arrow). Only the forced ventilation units supplied by the manufacturer may be used. The forced ventilation unit must be connected according to the applicable terminal diagram provided in the terminal box.

6.3 RFID transponder (memory motor)

There is the option to equip the system with an RFID transponder (for short: TAG) as a memory motor, special code MM, according to EW-N 1002, sheet 13. The

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D14-TAGspecial ATEX transponder (RFID System iID®2000, 13.56 MHz based on ISO 15693) is used.



The data may be read only with a reading device that complies with 2014/34/EU.

7. External heat and cold sources

If external sources of heat and cold are present, no additional measures are necessary if the temperatures at the installation site are not exceeded. If they are exceeded or if an impact on the operating temperatures or maximum surface temperatures are anticipated, suitable measures must be taken to maintain and demonstrate explosion protection. In case of doubt, the manufacturer must be consulted.

8. Maintenance and repair

Maintenance, repair and modifications to explosion-protected machines in Germany are subject to the German Ordinance on Industrial Safety (BetrSichV), the Explosion Protection Ordinance (ExVO, 11.GSGV), the safety instructions and the descriptions in the general maintenance manual.

Outside Germany, the relevant national regulations must be observed!

Further guidance on testing and maintenance of electrical installations and repair and overhaul of electrical equipment is given in IEC/EN 60079-17 and IEC/EN 60079-19. Work that has an impact on explosion protection includes:

- Repairs to the stator winding and terminals,
- Repairs to the ventilation system
- Repairs to the bearing and sealing of dust ignition-proof motors (Ex 2D, 3D)

and this may only be carried out by VEM service personnel or by/in authorised workshops of qualified personnel who have the necessary knowledge based on their professional training, experience and instruction. For dust ignition-proof motors, the dust ignition protection depends very much on the local conditions. For this reason, the motors in these areas must be checked and maintained regularly.



Thick layers of dust lead to a temperature increase on the surface of the motor. Dust deposits on motors and even their complete filling with dust must therefore be avoided as far as possible by appropriate installation and ongoing maintenance.

The specified surface temperature of the motor is only valid if the dust deposits on the motor do not exceed a thickness of 5 mm. These starting conditions (type of dust, maximum layer thickness, etc.) must be ensured. The motor must not be opened until sufficient time has elapsed to allow the internal temperatures to drop to non-ignitable levels. If the motors have to be opened for maintenance or repair work, this work must be carried out in a dust-free room if possible. If this is not possible, suitable measures must be taken to prevent dust from entering the enclosure.

During disassembly, special care must be taken to ensure that the parts necessary for the tightness of the construction, such as seals, flat surfaces etc., are not damaged.

Careful and regular maintenance, inspections and servicing are necessary to detect and eliminate possible faults in good time before consequential damage can occur. Since the operating conditions cannot be defined exactly, only general time limits can be given, provided that operation is trouble-free. They must always be adapted to the local conditions (dirt, load, etc.).

What needs to be done?	Time interval	Deadlines
Initial inspection	After approx. 500 operating hours	At the latest after six months
Airway control and surface of the motor	depending on the local degree of contamination	
Relubrication (optional)	See rating plate or lubrication plate	
Main inspection	Approx. 10,000 operating hours	Once a year
Drain condensation water	depending on climatic conditions	

The necessary lubrication intervals for roller bearings deviate from the inspection intervals and must be observed separately!

The machines are equipped with a relubrication device as standard. The binding specifications for storage and lubrication can be found on the rating plate. Further information on storage can be found in the assembly, operating and maintenance instructions for transnorm motors.

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Maintenance work (except relubrication) must only be carried out when the machine is at a standstill. It must be ensured that the machine is secured to prevent it from being switched on and has an appropriate warning sign.

Furthermore, safety instructions and accident prevention regulations of the respective manufacturers must be observed when using oils, lubricants and cleaning agents!

Adjacent parts that are live must be covered!

It must be ensured that the auxiliary circuits, e.g. standstill heating, are de-energized.

For the version with a condensation water drain hole, the drain plug must be coated with a suitable sealant (e.g. Epple 28) before reclosing!

The work must be indicated by an additional repair sign with the following information:

- Date
- Firm carrying out the work
- Type of repair, as appropriate
- Identification of the officially authorised competent person within the meaning of the BetrSichV, as appropriate



If the work is not carried out by the manufacturer, it must be accepted by an officially authorised competent person within the meaning of the BetrSichV. That person must issue a written confirmation of this or provide the machine with a test mark. In other countries, the relevant national regulations must be observed.

9. Painting and impregnation after repair or maintenance work



When repainting explosion-proof motors or impregnating a complete stator after rewinding, thicker layers of paint or resin may appear on the machine surface. (These can lead to electrostatic charges, with the result that there is a danger of explosion if discharged.) Charging processes in the vicinity can also lead to electrostatic charging of the surface or parts of the surface, and there may be a risk of explosion due to discharge. The requirements according to IEC/EN 60079-0: "Equipment - General requirements", section 7.4 and TRGS 727 must therefore be strictly observed by taking the following steps, among others:

Limiting the total paint or resin layer thickness according to the explosion group to

- IIA, IIB: Total coating thickness ≤ 2 mm
- IIC: Total coating thickness ≤ 0.2 mm

Limiting the surface resistance of the paint or resin used to

- IIA, IIB, IIC, III Surface resistance $\leq 1\text{G}\Omega$ for motors of group II and III

Disruptive discharge voltage ≤ 4 kV for explosion group III (dust only, measured by the thickness of the insulating material according to the method described in IEC 60243-1). Furthermore, the versions of E DIN EN 60079-32: "Electrostatic hazards", especially Annex A: "Fundamentals of static electricity", Annex B: "Electrostatic discharges in special situations" and Annex C: "Flammability of substances" must be taken into account.

10. Storage / long-term storage (over 12 months)

For storage or outdoor use, a superstructure or appropriate cover is recommended. Avoid long-term exposure to direct intense sunlight, rain, snow, ice or dust.

Long-term storage must be vibration-free in closed, dry rooms in a temperature range of -20 to $+40^\circ\text{C}$ and in an atmosphere free from aggressive gases, vapours, dust and salts. The motors should preferably be transported and stored in their original packaging. Storage and transport on the fan guards is not permitted. Unprotected metal surfaces, such as shaft ends and flanges, must be provided with long-term corrosion protection in addition to the temporary corrosion protection provided at the factory. If dew forms on the motors under ambient conditions, precautions must be taken to protect them against moisture. Special packaging with airtight welded film is then required or packaging in plastic film with moisture-absorbent substances. Packages of a moisture-absorbent material must be placed in the terminal box of the motors.

For transport, the eyebolts/load blocks of the motors must be used with suitable slings. The eyebolts/load blocks are only intended for lifting the motors without any additional attachments such as base plates, gears, etc.

Motors with reinforced bearings are supplied with a transport safety device. The transport lock on the shaft end should only be removed when the motor has been assembled and before switching on.

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Explosion-proof three-phase asynchronous motors with squirrel-cage rotor for high voltage

Turn the shafts at least once a year to avoid permanent standstill marks. If the bearings are stored for a longer period of time, the grease service life of the bearings will be reduced (ageing). It is advisable to check the condition of the grease on open bearings once a year. If there is any sign of de-oiling or contamination of the grease, the grease must be replaced. Closed bearings (ZZ 2RS) must be replaced > 48 months after a storage period.

11. Spare parts



With the exception of standard, commercially available and equivalent parts (e.g. roller bearings), only original spare parts (see spare parts list) may be used; this applies in particular to seals and connecting parts. The following information is required when ordering spare parts:

- Spare part designation
- Motor type
- Motor number

12. Disposal

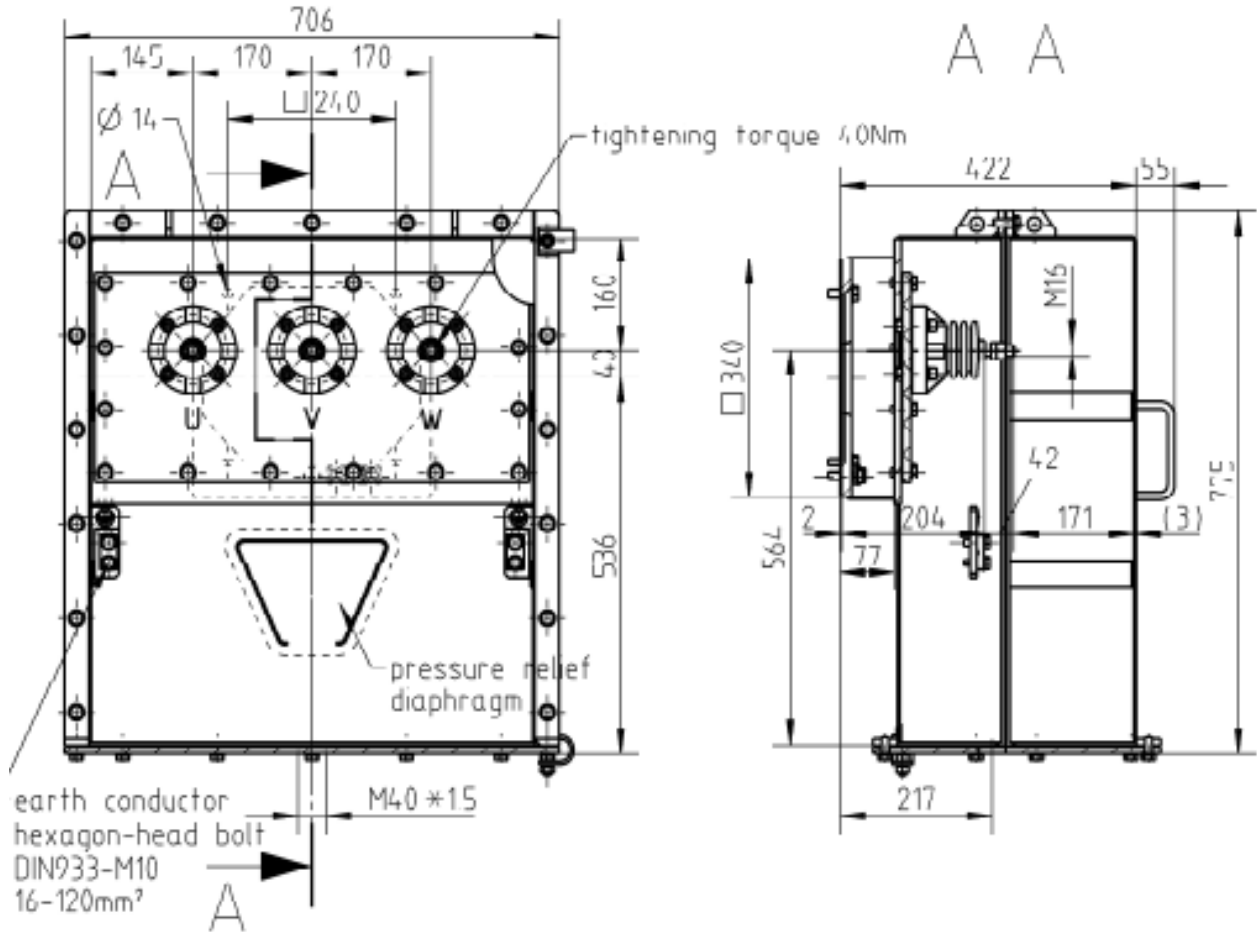
The applicable national regulations must be observed when disposing of the machines. Electric motors are regarded as components and therefore do not fall under the German Waste Electrical and Electronic Equipment Act or the WEEE2 Directive.

Please also note that oils and greases are disposed of in accordance with the Waste Oil Ordinance. They must not be contaminated with solvents, cold cleaners and paint residues.

The individual materials should be separated before recycling. The most important components are grey cast iron (enclosure), steel (shaft, stator and rotor plates, small parts), aluminium (rotor), copper (windings) and plastics (insulation materials such as polyamide, polypropylene, etc.). Electronic components such as circuit boards (inverters, encoders, etc.) are processed separately.

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 Explosion-proof three-phase asynchronous motors with squirrel-cage rotor for high voltage

13. Terminal box construction
13.1 terminal box



Annex 1



VEM motors GmbH · Postfach 101252 · 38842 Wernigerode

ERKLÄRUNG FÜR DEN EINBAU EINER UNVOLLSTÄNDIGEN MASCHINE
nach Maschinenrichtlinie 2006/42/EG, Anhang II Teil 1B
DECLARATION OF INCORPORATION OF PARTLY COMPLETED MACHINERY
acc. to Machinery Directive 2006/42/EC, Annex II Part 1B

Hiermit erklärt der Hersteller:
The manufacturer hereby declares:

VEM motors GmbH
Carl-Friedrich-Gauß-Strasse 1
38855 Wernigerode
Germany

der unvollständigen Maschine:
for the partly completed machinery:

Hochspannungsmotor	
Typ <i>W52R 400</i>	Serien-Nr.
High voltage motor	
Type <i>W52R 400</i>	Serial-No.

die Anwendung und Einhaltung folgender grundlegender Anforderungen nach Anhang I:
the application and fulfilment of the following essential requirements acc. to Annex I:

1.1.2, 1.1.3, 1.1.5, 1.2.6, 1.3.1, 1.3.2, 1.3.3, 1.3.4, 1.3.7, 1.3.8.1,
1.5.1, 1.5.2, 1.5.4, 1.5.5, 1.5.6, 1.5.7, 1.5.8, 1.5.9, 1.5.10, 1.5.13, 1.5.15,
1.6.1, 1.6.5, 1.7.2, 1.7.4.1

Die Inbetriebnahme der unvollständigen Maschine ist solange untersagt, bis die Konformität der Maschine, in welche die unvollständige Maschine eingebaut wurde, mit der Maschinenrichtlinie 2006/42/EG festgestellt ist.

The partly completed machinery must not be put into service until the final machinery into which they have been incorporated has been declared in conformity with the provisions of Machinery Directive 2006/42/EC.

Wir erklären, dass die speziellen technischen Unterlagen nach Anhang VII Teil B erstellt wurden und verpflichten uns, diese auf Verlangen den Aufsichtsbehörden in digitaler Form zu übermitteln.

We declare that the relevant technical documentation acc. to Annex VII Part B has been prepared and agree to submit it to the national authorities in digital form on request.

Bevollmächtigter für die Zusammenstellung der speziellen technischen Unterlagen:
Authorised person to compile the relevant technical documentation:


Frank Steuer VEM motors GmbH
Carl-Friedrich-Gauß-Strasse 1
38855 Wernigerode
Germany

Wernigerode, <Datum>
Wernigerode, <date>

.....
Wolfgang Wiedemann
Leiter Qualitätssicherung
Head of Quality Dept

Annex 2

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



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

VEM motors GmbH - Werk Zwickau
 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 26 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 17. May 2006 on machinery, and amending Directive 95/16/EC (recast),
 Official Journal of the European Union L157/24-86 of 09.06.2006
- 2011/65/EU Directive of the European Parliament and of the Council of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment,
 Official Journal of the European Union L 174/88 of 1.7.2011
- 2014/30/EU Directive of the European Parliament and of the Council of 26 February 2014 on the harmonization of the laws of the Member States relating to electromagnetic compatibility,
 Official Journal of the European Union L 96/79 of 29.3.2014

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 IEC 60079-0:2018 [IEC 60079-0:2017]
 EN 60079-1:2014/AC:2018-09 [IEC 60079-1:2014/COR1:2018]
 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. IBExU17ATEX0009 and IBExU17ATEX0010.

Wernigerode, 2020-05-01


 Dr. Koch
 Managing director
 VEM motors GmbH


 Perplies
 Explosion protection Representative
 Wernigerode


 Blankenhagen
 Explosion protection Representative
 Zwickau

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



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

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 450 (IE ⁺ -)W... 63 up to 450 (IE ⁺ -)B... 80 up to 450 (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⁾

¹⁾ conductive dust

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

Supplementary installation, operating and maintenance instructions English

Explosion-proof three-phase asynchronous motors with squirrel-cage rotor for high voltage

Annex 3

Pre-purge before start

Supplement to the operating instructions for explosion-protected electrical machines of ignition protection types "ec" (only for atmospheres in Zone 2) with operating mode other than S1 or S2 and rated power over 100 kW and increased safety "eb".

See also sections 3 and 5 "Ignition risk assessment".

High-voltage electric machines in the W52R series have connections for pre-purging. A pre-purge must be carried out according to section xx or xx.

Protective functions:

The "pre-purge" system ensures that there is no explosive gas inside the motor when the motor starts. If there is explosive gas inside the motor, there is a risk of explosion during start-up.

The "pre-purge system" does not correspond to the ignition protection type "pressurised enclosure" Ex p II according to IEC/EN 60079-2, especially its pre-purging conditions.

System description

One flange in the motor for inert gas supply / one flange in the motor for gas discharge (for pre-purging).

The position of the flange is determined by the motor manufacturer.

Before putting the motor into operation, the free volume of the motor enclosure must be purged with inert gas, if necessary after ignition risk assessment. After the purging phase, the input and output valves are closed. There is no monitoring of the internal pressure.

One or two mechanical blow-off valves are fitted on the top of the motor.

Response pressure in the purging phase 3-20 mbar.

Inert gas supply e.g. via the following devices (input)/ball valve/controller with filter/pressure reducing valve/safety valve/manometer

The devices for inert gas supply and gas outlet are not included in the scope of delivery.

They are only supplied by the motor manufacturer on special order.

Processed plant compressed air can also be used as inert gas.

When starting the motor, the interior of the motor must be filled with inert gas.

The purging time depends on the available inert gas volume (dm³/min) and the motor enclosure volume. The required purging time must be determined before initial operation.

If the purging system contains electrical equipment, it must be tested and certified by an approved test centre when used in potentially explosive atmospheres. The relevant installation regulations and national regulations must be observed. Special attention must be paid to the operating instructions of the devices used!

Supplementary installation, operating and maintenance instructions English

Explosion-proof three-phase asynchronous motors with squirrel-cage rotor for high voltage

Annex 4

Information about cable glands approved for explosion protection

The terminal boxes are designed as standard with metric threaded holes in accordance with IEC/EN 62444 or as a special version with NPT threaded holes according to ANSI B1.20.1-1983. On delivery, they are sealed with plugs or ATEX-certified cable glands.

For connection of the machine, only cable glands, cable entries and sealing plugs which are designed according to Directive 2014/34/EU and have a minimum protection class of IP 55 or match the protection class of the motor must be used.

For motors with ignition protection type “tD”, which require protection class IP 6X, the cable glands and plugs must be designed according to Directive 2014/34/EU and have a minimum protection class of IP 65.



All unused cable entry openings must be sealed with plugs of the appropriate minimum protection class approved according to Directive 2014/34/EU. Existing plugs must be checked for compliance with this specification and replaced if necessary.

The thread type is indicated on the equipment (rating plate or terminal box).

Alternatively, the number and position of the entry threads are indicated on the dimension drawing of the motor. Unless otherwise ordered, cable glands from Jacob or Hawke are used internationally. The following specifications must be observed for these screw connections:

Ex brass screw connection, metric thread,
EC Certificate of Conformity DMT 99 ATEX E 016

Thread	Item no.	For cable diameter [mm]	Width across flats [mm]	Installation torque [Nm]
M 63x1.5	50.663 M/EX	32...42	65	20
M 63x1.5	50.663 M1/EX	40...48	65	20
M 75x1.5 *)	HAWKE International	54.5...65.3	95	20
M 80x1.5 *)	HAWKE International	67...73	106.4	20
M 90x1.5 *)	HAWKE International	67 ... 77.6	115	20
M 100x1.5 *)	HAWKE International	75 ... 91.6	127	20

*) Baseefa06ATEX0056X or IEC BAS 06.0013X.

Ex-EMC brass cable gland, metric thread
EC Certificate of Conformity DMT 99 ATEX E 016

Thread	Item no.	For cable diameter [mm]	Width across flats [mm]	Installation torque [Nm]
M 63x1.5	50.663 M/EMC/EX	32...42	65	20
M 63x1.5	50.663 M1/EMC/EX	40...48	65	20
M 75x1.5 *)	HAWKE International	54.5...65.3	95	20
M 80x1.5 *)	HAWKE International	67...73	106.4	20
M 90x1.5 *)	HAWKE International	67 ... 77.6	115	20
M 100x1.5 *)	HAWKE International	75 ... 91.6	127	20

*) Baseefa06ATEX0056X or IEC BAS 06.0013X.

If cable glands or plugs certified according to Directive 2014/34/EU from other manufacturers are used, their manufacturer's specifications must be observed.

Certificate number: IECEx IBE 20.0025

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For all references (relating to additional equipment, cable glands, add-on components etc.) to Directive 2014/34/EU, components may instead be approved according to IECEx or, if selected by the plant operator, they must be approved according to IECEx.

The motors are labelled as IECEx compliant.

For IECEx-approved motors, references to categories / zones are to be understood as references to the corresponding device protection level.

(Here: category 3, assigned zone 2 corresponds to EPL Gc).

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