Motori elettrici a sicurezza aumentata
Increased safety electric motors
Moteurs électriques à sécurité augmentée
Elektromotoren mit verstärkter Sicherung
Motores eléctricos con seguridad aumentada

II 2G, Ex e, II IP55

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Flameproof
Motors

safety instructions

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GB CONTENTS

1. Introduction

These safety instructions refer to the installation, operation and maintenance of increased safety electric motors for use in areas where there is a presence of potentially explosive atmospheres.

The increased safety motors have the following protection types against the risk of explosion:

- Ex e II: increased safety motor according to the IEC 60079-7 standards.

These instructions must be followed in addition to the recommendations provided in the instruction and maintenance manual.

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2. Installation of increased safety electric motors

2.1 Suitability of the motor to the place of installation

Check the motor is suitable to the area classification and the characteristics of the flammable substances present.

European directives 94/9/EC dated 23 March 1994 (relating to equipment) and 1999/92/EC dated 16 December 1999 (relating to plants) establish the essential safety requirements against the risk of explosion in classified areas.

2.1.1 Places subject to the presence of inflammable gas, fumes or mists.

The classification criteria for areas subject to the risk of explosion are laid down in the IEC 60079-10 standard.

The technical requirements for electrical plants located in classified areas are established by the IEC 60079-14 standard.

The choice of the type of motor, according to these technical and legislative provisions, must take into account the following factors:

- type of plant. mines (group I), above ground plants (group II)
- zone classification: 0, 1, 2 (for which equipment of category 1, 2, 3, respectively are suitable)
- characteristics of the flammable substances present in the form of gases, vapours or fumes:
- temperature class T1, T2, T3, T4, T5, T6 (defines the ignition temperature of the gases)

2.2 Nameplate safety data

In addition to operating data, the information provided on the nameplate, includes:
- information necessary to select the appropriate type of motor and for the correct installation of the motor itself
- references to the notified bodies responsible for certification
- fundamental data for a correct diet
- fundamental data for choosing protection guards correctly.

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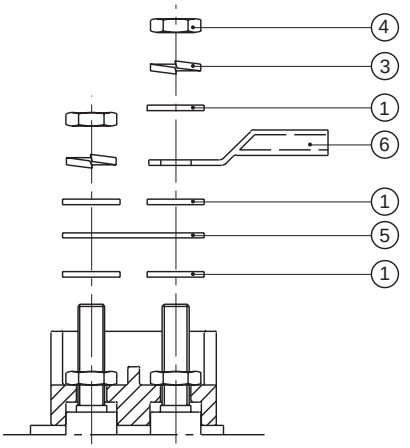
CE	Mark of conformity to the applicable European directives
	Community mark specifically indicating explosion protection
II 2G	Motor suitable for above ground plants with the presence of category 2G dust
Ex e	Motor with increased safety terminal box
II	Enclosure suitable for Group II substances (gases)
T3	Motor temperature class (maximum surface temperature)
XYZW xx ATEX yyy	XYZW: laboratory that issued the CE certificate type xx: year in which the certificate was issued yyy: yyy: type certificate number
0000	Reference number of the notified body that executed the notification of the production system quality
Ia/In ...	Ratio between the locked rotor current value and the rated current
t_E	Time allowed under rated voltage supply conditions with locked rotor to respect the temperature class limits

Notes:
- Category 2G motors are also suitable for use in settings that require category 3G motors.
- Motors with a given temperature class are also suitable for all substances with a higher temperature class (for example: T3 motors are suitable for substances with a T2, T1 temperature class).
- If the certificate number indicated on the nameplate is followed by an “X” , the user must follow specific conditions of use described in this manual.
- Increased safety motors are normally intended for use at ambient temperatures ranging between -20 °C and +40 °C. If the motor has to be employed for operations outside these ambient temperature range, the temperature values must be specified at the time the order is issued and indicated on the nameplate.
- The values Ia/In and t_E are essential in choosing thermal protection. Only choosing and setting the protective devices properly can ensure that the temperature class limits are respected under all operating conditions, even when the rotor is locked.

2.3 Mains

Connections to the mains must be performed as shown in the wiring diagrams supplied with the motor.

Connection to the power terminal is to be performed in the sequence indicated in the figure below.



1 - Flat brass washer
3 - Spring washer
4 - Brass nut
5 - Brass plate
6 - Insulated cable lug.

Figure 1
Ex e motors connection sequence

Connections to the main terminals must be executed using the tightening torques indicated below:

SCREW SIZE	TIGHTENING TORQUE MAXIMUM [Nm]
M4	2
M5	3,2
M6	5

The air insulation distances as specified in the IEC 60069-7 standard and indicated in the following table must be maintained when connections are made among conductors having different potential:

RATED VOLTAGE - U [V]	MINIMUM DISTANCE IN AIR - L*m* [mm]
$125 < U \leq 160$	3,2
$160 < U \leq 200$	4
$200 < U \leq 250$	5
$250 < U \leq 320$	6
$320 < U \leq 400$	6
$400 < U \leq 500$	8
$500 < U \leq 630$	10
$630 < U \leq 800$	12

2.4 Auxiliary connections

Verify the type of thermal protection built into the windings before proceeding with the connection.

Use an adequate relay according to the type of protective device used (PTC or PT 100 thermistors).

2.5 Cable entries

Connections must be made via cable or conductor entries in a conduit conforming to the IEC 60079-14 standard.

The cable entry must be made without modifying the specific properties of the protection type as indicated in the IEC 60079-7 standard.

When the cable entry is made using a cable gland, the type of cable gland must be selected correctly in relation to the type of plant and the type of cable. The cable gland must be tightened fully until the seal rings ensure the necessary pressure:

- to prevent transmission of mechanical stress to the motor terminals
- to ensure the mechanical protection degree) of the terminal box.

Consequently Ex e cable glands must be used, certified according to the IEC 60079-0 and IEC 60079-7 standards (in compliance with Directive ATEX 94/9/CE) and providing a minimum protection level of IP55.

2.6 Earthing connection

Increased safety motors are provided with two earthing terminals: one inside the terminal box and the other on the motor frame. Depending on the cross-section of the line conductor, the earthing conductor cross-section must be:

S - LINE CONDUCTOR SECTION	H - EARTH CONDUCTOR SECTION
$S \leq 16\ mm^2$	H = S
$16\ mm^2 < S \leq 35\ mm^2$	$16\ mm^2$
$S < 35\ mm^2$	$H \geq 0,5\ S$

2.7 Further warnings for the installation

Increased safety motors must be protected against overloads by means of a countdown protective device that automatically disconnects the power supply, or by a using a device to control the temperature directly by means of temperature sensors built into the windings.
Furthermore, as indicated in point 2.2, it is essential that the protective device's activation curve conforms to the Ia/In and t_E values indicated on the nameplate.

When installing the motors, make sure that the motor ventilation is not impaired by obstacles placed in the surrounding area.

For this purpose a minimum distance equal to 40 mm must be maintained between the motor and any device that is not part of the motor.

3. Inspections and maintenance of increased safety motors

Inspections and maintenance of increased safety motors must be carried out in compliance with the criteria laid down in the IEC 60079-17 standard.

The electrical connection terminals must be tightened fully to avoid high contact resistances and consequential overheating.

Care must be taken to ensure that the insulation distances in air and on the surfaces between the conductors are maintained, as established by the standards.

Damaged screws must be replaced immediately using screws of equivalent or superior quality.
All screws utilised to seal the motor and the terminal board shall be tightened fully.

Replacement of gaskets and cable entry parts shall be executed using components that are identical to the components supplied by the manufacturer to ensure the protection degree is maintained.

Surfaces of coupling joints between casing and the guards must be kept clean.

4. Repairs to increased safety motors

Repairs to increased safety motors must be executed in compliance with the criteria specified in the IEC 60079-19 standard.

If repairs are not executed by the manufacturer, they must be carried out at workshops which have the necessary equipment for repairs and adequate technical expertise concerning the motor protection types.

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If repair work has to be performed on parts that influence the flameproof protection characteristics, the motor construction data (for example: dimensions of rotor/stator air gaps, winding characteristics, terminal boards, etc.) must not be modified and the repaired parts must be tested.

A written report must be prepared with the detailed indication of the work carried out.

If after the repair work has been completed, the motor complies entirely with the standard and with the certificate, an additional nameplate shall be affixed to the motor (without removing the original nameplate) showing the following marks:

- Symbol **R**
- name or trademark of the repairer
- serial number given to the repair operation by the repairer
- date of repair

If following a repair that modifies relevant aspects concerning protection against explosions, the motor does not comply with the certificate, the original nameplate must be removed and the motor can no longer be considered suitable for use in areas where there is danger of explosion.

In order to be utilised in such areas the motor must be examined again by a competent certification body.

Programma di vendita	Sales programme	Programme	Lieferprogramm	Programa de venta
Motori antideflagranti Ex d - Ex de • gruppo I-IIA-IIB-IIC • categoria M2, 2G, 2D, 2GD • classe T3-T4-T5-T6 • trifasi, monofasi • con freno	**Flameproof motors Ex d - Ex de** • group I-IIA-IIB-IIC • category M2, 2G, 2D, 2GD • class T3-T4-T5-T6 • threephase, singlephase • with brake	**Moteurs antidéflagrants Ex d - Ex de** • groupe I-IIA-IIB-IIC • catégorie M2, 2G, 2D, 2GD • classes de température T3-T4-T5-T6 • triphasés, monophasés • avec frein	**Explosionsgeschützte Motoren Ex d - Ex de** • Gruppe I-IIA-IIB-IIC • Kategorie M2, 2G, 2D, 2GD • Klasse T3-T4-T5-T6 • Dreiphasen- und Einphasen-Ausführung • mit Bremse	**Motores antideflagrantes Ex d - Ex de** • grupo I-IIA-IIB-IIC • categoría M2, 2G, 2D, 2GD • clase T3-T4-T5-T6 • trifásicos, monofásicos • con freno
Motori a sicurezza aumentata Ex e • gruppo II • categoria 2G • classe T1-T2-T3	**Increased safety motors Ex e** • group II • category 2G • class T1-T2-T3	**Moteurs à sécurité augmentée Ex e** • groupe II • catégorie 2G • classes de température T1-T2-T3	**Motoren in Schutzart "erhöhte Sicherheit" Ex e** • Gruppe II • Kategorie 2G • Klasse T1-T2-T3	**Motores de seguridad aumentada Ex e** • grupo II • categoría 2G • clase T1-T2-T3
Motori non sparking Ex nA • gruppo II • categoria 3G, 3GD	**Non sparking motors Ex nA** • group II • category 3G, 3GD	**Moteurs anti-étincelle Ex nA** (non sparking) • groupe II • catégorie 3G, 3GD	**Funkenfreie Motoren Ex nA** • Gruppe II • Kategorie 3G, 3GD	**Motores no sparking Ex nA** • grupo II • categoría 3G, 3GD
Motori chiusi con ventilazione esterna CEI/IEC • trifasi, monofasi • categoria 3D	**Totally enclosed fan cooled IEC motors** • threephase, singlephase • category 3D	**Moteurs IP 55 CEI-IEC avec ventilation extérieure** • triphasés, monophasés • catégorie 3D	**Vollgekapselte luftgekühlte Motoren nach IEC** • Dreiphasen- und Einphasen-Ausführung • Kategorie 3D	**Motores cerrados con ventilación exterior IP 55 CEI/IEC** • trifásicos, monofásicos • categoría 3D
Elettropompe centrifughe antideflagranti per macchine da stampa Ex d - Ex de	**Centrifugal flameproof electric pumps for printing machines Ex d - Ex de**	**Electropompes centrifuges antidéflagrantes pour machines d'imprimerie Ex d - Ex de**	**Explosionsgeschützte Zentrifugal-Elektropumpen für Druckmaschinen Ex d - Ex de**	**Electrobombas centrífugas para máquinas de impresión Ex d - Ex de**
Elettropompe centrifughe per macchine utensili	**Centrifugal electric pumps for machine tools**	**Electropompes centrifuges pour machines-outils**	**Elektropumpen für Werkzeugmaschinen**	**Electrobombas centrífugas para máquinas herramientas**

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