



# *Use and maintenance manual and ATEX provisions*

*In compliance with the harmonised standards of ATEX Directive 2014/34/EU*



## **SMEM s.r.l.**

Via Monte Grappa, 33

20900 Monza (MB)

Tel: 039 2000231

Fax: 039 2000664

http://www.smem.it E-mail: [info@smem.it](mailto:info@smem.it)

ISO 9001:2008 Certified Company

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## 1 GENERAL SAFETY INFORMATION

### 1.1 Purpose of the manual

This manual was compiled by the manufacturer and forms an essential element of SMEM Motors corporate documentation; as such, it must accompany the motor everywhere it goes until it is dismantled, and be readily available for quick consultation by users and/or maintenance personnel. Before carrying out any operations on the motor, all personnel involved must absolutely and necessarily have read this manual very carefully. If the manual is lost, crumpled or not completely legible, a copy must be requested from the authorised retailer or directly from SMEM s.r.l. This manual was developed by the electric motor manufacturer to provide the necessary information to those authorised to carry out installations, use and repair activities in safety. These instructions apply to 6SM, 6SM2, 7SME, 7SM2, AV, AP, 6ATC, 6SH, T2AH, 7SM3, T3A, T3AH series electric motors and 6MY series 6MYT single-phase electric motors.

SMEM s.r.l. reserves the right to make changes, additions or improvements to this manual, without this being grounds for finding this publication inadequate or lacking for safety purposes.



- The instructions provided in correspondence with the symbol shown above, highlighted by a border, refer exclusively to equipment that complies with ATEX Directive 2014/34/EU.
- This manual deals with the main topics concerned with explosion protection, and is an integral part of the instruction manual for the use and maintenance of three-phase asynchronous motors, closed design, and cages with grade IP65 mechanical protection.

### 1.2 Manufacturer's Liability

The manufacturer does not accept any liability in the event of:

- Use of the motors contrary to national legislation on safety and accident prevention
- Failure or incorrect observance of the instructions provided in this manual and the instruction manual for the use and maintenance of three-phase asynchronous motors, closed design, cage with grade IP65 mechanical protection
- Electrical supply defects
- Modifications or tampering
- Operations performed by untrained personnel

The safety of these motors is also subject to compliance with the instructions given in this manual. Read the instructions for use and maintenance in full, and observe all of the precautions indicated, in particular:

- Always operate within the motor's limits of use
- Entrust the maintenance to qualified personnel

- Only use original spare parts


**Caution!** The instructions in this manual do not replace, but summarise the obligations in current legislation on safety standards.



- For use in compliance with classifications in the ATEX Directive 2014/34/EU, read the technical data on the nameplate and the documentation that must be posted near the equipment.
- Tune-up and maintenance procedures must be carried out in the absence of an explosive atmosphere by qualified personnel, and the power supply must be disconnected.
- The motor is intended for use in an explosion-hazardous environment due to the presence of gas-air and air-powder mixtures.
- Group II (not in mines or underground) and 3G D category equipment can be used in Zones 2 and 22, a place where the formation of an explosive atmosphere, in the form of combustible gases or powders, is unlikely during normal activities; use the motor in conjunction with other appliances only if they can at least operate in the same area. The characteristics of the explosive mixture must comply with the maximum temperature data reported on the marking.
- When using the motor in an explosive atmosphere due to air-powder mixtures, the minimum trigger temperature of the dust cloud must be higher than the value read on the marking plate, multiplied by the coefficient 1.5, to which 75 K must then be added if a deposition of layers of dust less than 5 mm is assumed.


### 1.3 Labelling

Each motor is fitted with an identification plate containing the main technical data relating to its functional and construction characteristics. All of the data reported on the labelling must be specified on any orders for spare parts.

<b>SIEMENI</b>		MONZA - ITALY		IEC 60034-1		<b>CE</b>	
motori elettrici electric motors							
N°		TYPE					
Kw		A		B			
V.		Hz rpm		COS φ			
IE2-		% (100%)		% (75%)		% (50%) YEAR	
~3		S1		IP 65		INS.CL F Kg	
		II 3G Ex nA IIC T4 Gc				T <sub>min</sub> -20 T <sub>max</sub> 40°C	
		II 3 D Ex tc IIIC T135°C Dc IP65				ATEX 94/9/CE - art. 8 c. All. VIII	

<b>SIEMENI</b>		MONZA - ITALY		IEC 60034-1		<b>CE</b>	
motori elettrici electric motors							
TYPE		N°					
IE2-		(100%) -		(75%) -		(50%)	
COS φ		INS.CL. F		IP 65		kg	
Hz		kW		V		A rpm	
CONN.		S1		DATE			
		II 3G Ex nA IIC T4 Gc				T <sub>min</sub> -20 T <sub>max</sub> 40°C	
		II 3 D Ex tc IIIC T135°C Dc IP65				ATEX 94/9/CE - art. 8 c. All. VIII	

## Key to ATEX symbols

	ATEX Marking
<b>II</b>	Belongs to equipment group
<b>3</b>	Category of apparatus
<b>G</b>	Use in an explosive atmosphere in the presence of air mixed with gases, vapours or mists
<b>D</b>	Use in an explosive atmosphere in the presence of powders
<b>NA</b>	Method of protection for gas (non-sparking product)
<b>TC</b>	Method of protection against the ingress of dust
<b>IIC</b>	Gas group
<b>IIIC</b>	Powders group (conductive powders)
<b>T4</b>	Temperature class for gas
<b>T135</b> °C	Temperature class for powders
<b>GC</b>	Equipment for atmospheres that are explosive due to the presence of gases with an "enhanced" level of protection that are not a source of ignition during normal operation and has some additional protection measures to ensure an ignition source remains inactive in the event of a regularly expected event
<b>DC</b>	Equipment for explosive atmospheres due to the presence of powders with an "enhanced" level of protection which does not constitute a source of ignition during normal operation, and which may have additional protections to ensure it remains inactive as a source of ignition in the event of regular and expected malfunctions
<b>IP65</b>	IP protection class

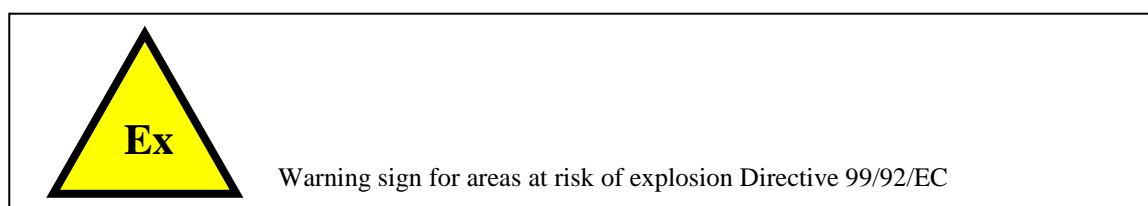
### 1.4 Hazardous areas and zones

Hazardous areas are zones in which explosive atmospheres can develop under certain conditions.

The user is required to carry out, under his/her own responsibility, classification of hazardous areas as indicated in European Directive 1999/92/EC.

The standard EN 60079-10-1 provides the criteria for classifying hazardous areas in relation to the chemical nature, physical characteristics and quality of the substances used, depending on the frequency and time period in which it is possible for an explosive mixture to form.

The criteria for areas with a risk of explosion due to flammable and conductive powders are dictated by the standard EN 60079-10-2.



### 1.4.1 Classification of hazardous areas in zones

European Directive 1999/92/CE provides for the classification of areas at risk of explosion, according to the provisions shown in the table below.

Area of use with presence of GAS	Area of use with presence of POWDERS	Hazard level of the ZONE of use
ZONE 0	Zone 20	Explosive atmosphere <b>ALWAYS PRESENT</b>
Area 1	Zone 21	Explosive atmosphere <b>PROBABLE</b>
Zone 2	Zone 22	Explosive atmosphere <b>UNLIKELY</b>

### 1.4.2 Equipment categories

PROTECTION LEVEL ensured by the equipment	BELOW GROUND	SURFACE	
	Category	GAS category	POWDERS category
Very high	M1	1G (zone 0)	1D (zone 20)
High	M2	2G (Zone 1)	2D (Zone 21)
Normal	NO PROVISIONS	3G (Zone 2)	3D (Zone 22)

### 1.4.3 Temperature classes (for atmospheres with gas)

Ignition temperature of the explosive mixture (°C)	Temperature class	Maximum surface temperature of the electrical equipment at an ambient temperature of 40 °C	
		°C	
over 450	T1	450	842
from 300 to 450	T2	300	572
from 200 to 300	T3	200	392
from 135 to 200	T4	135	275
from 100 to 135	T5	100	212
from 85 to 100	T6	85	185

## 2 TECHNICAL INFORMATION

The motor has been designed and built to be used in industrial areas in zones classified as 2 (for categories 3G and 3D).

The motor is suitable for operations in places where the following environmental parameters are guaranteed:

Temperature between - 20°C and + 40°C,

Relative humidity:  $\leq 80\%$ .

The motor has been designed, constructed and tested to operate in safe conditions with gases/vapours having a minimum auto-ignition temperature higher than 135 °C.

The user must ensure that the electrical system that power the motor has been adequately protected from an explosion risk, and that the explosion protection document has also been drawn up, as required by Directive 1999/92/EC.

The electrical part of the motor was built in compliance with Directive 2006/95/EC (low voltage) and Directive 2004/108/CE (EMC).

### 3 ENGINE CHARACTERISTICS

All motor characterisation data, such as:

- Electrical and mechanical characteristics,
- Technical data,
- The specified dimensions

are illustrated in detail in the catalogue.

### 4 TRANSPORTATION & STORAGE

Report any damage that arises during transportation promptly. If damage arises, do not switch on the motor. Tighten the transport eyebolts. These are sized only for the weight of the motor and therefore increasing the load is not permitted. Where necessary, use a means of transport dimensioned for higher weights (e.g. ropes). Before starting up, remove all of the parts used to secure the system during transport. These parts must be retained for any subsequent transport.

If the motors are stored, we advise you to follow the recommendations below:

- avoid outdoor areas,
- store in a dry place,
- the environment must be sufficiently clean, dust-free and free of vibrations ( $\leq 0.2$  mm/s) to avoid damage to bearings,
- avoid periods of prolonged storage, as it reduces the lifespan of the grease,
- before starting up, measure the insulation resistance. With values lower than 1 k $\Omega$  for each volt of nominal voltage, dry the windings.



- The motors must not be stored in potentially explosive atmospheres.
- Before using a motor, clean any residual dust and/or traces of oxidation from the earth connections and the casing.

## 5 INSTALLATION

Please follow the instructions below for installation:

- verify that there was no damage during transport;
- properly clean the system components from packaging residues and any protective products;
- check that the value of the supply voltage printed on the motor nameplate coincides with the mains voltage;
- the contact surfaces of equipotential bondings and the identification plate should not be painted;
- check that the accessories used for the cable entry and for closing unused openings are certified as follows: according to EN 60079-15 for motors in Ex nA execution, and suitable for the IIC gas group; according to EN 60079-31 for Ex tc version motors and to guarantee a minimum degree of protection, IP65 in accordance with EN 60529;
- install the motor on a flat surface;
- make sure that the feet or the flange are tightened and in the case of a direct coupling, that the motor is perfectly aligned;
- avoid creating resonances equal to the motor rpm frequency or double the mains frequency;
- turn the rotor by hand to check there are no grinding noises;
- check the direction of rotation with the coupling disengaged;
- key (extract) the driven elements (e.g. belt drive pulley, coupling, etc.), only by means of special devices (hot shrink fit). Avoid unintended voltages on the pulley (refer to the technical data sheet catalogue);
- in constructive variants with the shaft end facing down, it is advisable to apply a protective roof. If the shaft end is facing up, apply a cover to prevent the ingress of foreign objects into the fan;
- make sure there is adequate ventilation;
- do not obstruct ventilation. The discharged air, including that coming from other groups, must not be immediately re-drawn;
- in the case of ambient temperatures not between -20°C and + 40°C, contact SMEM s.r.l.;




- The installation procedures must take place in the absence of an explosive atmosphere.
- The atmosphere of use must comply with the maximum surface temperature indications displayed on the plate according to ATEX regulations.
- Provide suitable protections to prevent hazardous powder accumulations-liquids close to seals and protruding shafts.
- For anti-unscrewing safety, apply liquid sealant onto the threads of all the screws used to fix the motor onto the structure.
- Make sure that the applied load does not exceed the values the motor is intended for



## 5.1 Indications for electrical connection

Operations for connecting to the electric network (also applies to auxiliary circuits) must be performed in compliance with the following requirements:

- any operation on the system must be carried out by trained personnel;
- the motor must be deactivated and isolated;
- make sure an accidental reboot is impossible;
- make sure that there is no voltage;
- exceeding the tolerance values indicated in EN 60034 part 1 (voltage  $\pm 10\%$ , frequency  $\pm 2\%$ , shape and symmetry of the sinusoidal curve) leads to an increase in heating and influences the electromagnetic tolerance). Observe the plate data and the circuit diagram contained in the connection box;
- with the three-phase 380 V mains, the motor carrying the triangle/star/400/690 V plate is connected in a triangular way according to the diagram in the terminal box cover;
- with the three-phase 380 V mains, the motor carrying the triangle/star/230/400 V plate is connected to the star according to the diagram in the terminal box cover;
- a 230/400 V triangle/star motor can be connected to the three-phase 220 V mains, but must be connected via a triangle. Cage motors connect to the mains via a three-pole switch, a three-pole safety switch, motor-driven, or via a contactor;
- where the network does not support a direct input current, the motor can be started by means of a star-triangle switch. This is only possible for motors whose winding connections for the rated voltage are triangular. With this start-up, the fact the starting current falls to one third of its value must be taken into account, so this starting mode is only advisable in machines without a load;
- with a single-phase 220 V grid, the single-phase motor is connected according to the diagram on the terminal block cover;
- the connection must be made in such a way as to ensure a long-lasting and safe electrical connection (avoid protruding ends of wires). Make the protective connections;
- follow the tightening torques for connecting the terminal blocks;

	Threads	M4	M5	M6	M8	M10
	Tightening torque (Nm)	0.6 ... 0.12	1.8 ... 2.5	2.7...4	5.5...8	9...13

- make sure that no foreign bodies, dirt or moisture are present in the connection box. Close the unused cable glands and the box itself to test for penetration by dust/powders and water;
- in a test operation without any driven elements, ensure the key;
- for motors with brakes, check for correct operation before putting into service;
- a change in the direction of rotation can be obtained by interchanging the two phases. If changes in the direction of rotation of the motor are very frequent, a reversible switch must be used;

- motors in service must be protected against short circuits, overloads and, if necessary, the return voltage; to achieve this, fuses, contactors with bimetallic relays and safety switches are used.

## 6 Start-Up

Before starting the motor, carry out a general check, making sure you have complied with all the rules in the paragraph relating to the installation procedures.

In particular check:

- that the motor supply voltage corresponds to the one expected;
- that the mounting position of the motor is as expected;
- check the connection plate connection, tighten all its nuts and fix the terminal board cover, taking care not to damage the gaskets;
- manually check the rotation of the motor;
- once the fuse has been inserted, you should checked whether all of the phases have a voltage and, if possible, measure their values.

Discontinue use if abnormal operations are found, and contact SMEM s.r.l.



Before commissioning, check:

- The ATEX compliance of any accessories connected to the machine.
- The compatibility of the atmosphere of the location in which the motor has to operate with the marking indications.
- The maximum temperature of the motor surfaces must not exceed the value shown on the marking.
- Clean the motor once the installation phases have been completed, and make sure there is no accumulation of powders/dust greater than 5 mm.

## 7 OPERATION

During motor operation, scrupulously observe the instructions below:

- vibration intensity in the order of  $\leq 3.5$  mm/s ( $P_N \leq 15$  kW) or  $\leq 4.5$  mm/s ( $P_{N15} > 15$  kW) with operation without coupling are negligible;
- in case of anomalies with respect to normal operation (increase in temperature, noise, vibrations), it is advisable to turn the motor off. Check the cause of the malfunctions and contact SMEM s.r.l. if necessary;
- do not, under any circumstances, disarm the protection devices, even during test and/or maintenance operations;
- the operation of forced ventilation motors is only allowed with the external fan on.

## 8 MAINTENANCE

- Before carrying out any maintenance operations, make sure that the motor power supply is switched off, put it into an "out of service" condition and then activate all of the safety devices provided;
- Use only original spare parts, by referring to the indications given in the motor catalogue;
- Replace the bearings according to the following instructions:
  - A. 20,000 working hours for two-pole motors;
  - B. 40,000 hours for other polarities differing from point A
- re-grease after three years at the latest;
- in the case of bearings with a greased nipple, proceed with motor cooling with the motor running;



Before proceeding with any maintenance activity, make sure that:

- the power supply to the motor is turned off;
- the surroundings have no explosive atmosphere;
- clean the outside of the motor from any powder or dust deposits that could produce deposits higher than 5 mm;
- you comply with the installation, commissioning and maintenance instructions.

The user must periodically provide for:

- checking the bearings are functioning (manual movement). Should any imperfections arise, proceed with replacement;
- clean and grease the connections of the motor's earthing system;
- clean any residuals of poor present on the electrical parts.

Contact SMEM srl for any extraordinary maintenance activities (where replacement parts and / or spare parts are expected). Spare parts must be compatible with uses in zone 2/22 (II 3 GD T4 minimum).

The equipment used during maintenance must be suitable for use in Zones 2 and 22 (II 3 GD T4 minimum).

## 9 CLEANING

Before starting cleaning operations, put the motor into safety.

During cleaning operations, the operator must make sure that the equipment used (portable lamps, vacuum cleaners, etc.) is of a category suitable for the environment (category II 3 GD).

## 10 CLAIMS

In the event of motor failure before the warranty period expires, and if such a fault could be considered a factory defect, you should inform SMEM s.r.l. before returning the motor and list the following data:

- The exact transcription of the motor nameplate;
- The type of connection for the motor in service;
- The mains voltage and the full load current;

- The ambient temperature and that of the motor casing;
- The operating regime;
- The nature and duration of the malfunction;

The free repair fee will be determined

- by the expiry date of the terms of the guarantee;
- If the fault was caused by manipulation or incorrect installation;
- If the motor has been disassembled before sending it for repair.

## 11 MALFUNCTIONS: CAUSES AND REMEDIES

Malfunction	Possible causes	Solutions
The motor will not start	Interruption of power supply	Check the fuses, the safety switch or the contactors
	Interruption of the stator circuit e.g. in the triangular/star switch	Separate the lines, examine the switch and the phases on the connecting plate
	Damaged bearings	Replace the bearings - Contact SMEM s.r.l.
	Bad connection in two-speed motors	Change the link
The motor starts slowly, the rotation speed decreases precipitously when it is under load	The motor intended for the triangle connection, however, has been connected to a star	Change the link
	The voltage is too low	Switch off the motor until the voltage is restored
When the ignition is switched off, the fuse or safety switch is switched off	The lines of the switch on the stator are touching each other	Separate the lines
	The two phases of the stator are in contact or touch the iron in between	Separate the lines, and test the phases between them or towards the mass. Make the necessary adjustment
The motor heats up too much, the safety switch or contactor switches off	Overload	Measure the current. If it's too high, eliminate the cause of the overload in the motor in service, or use a bigger motor
	Bearings damaged or poorly lubricated or defective	Check the wear of the bearings (especially for sealed bearings) and the lubrication
	Excessive ambient temperature	Increase the cooling or correct room temperature
	Suction opening of the obstructed fan cover	Clean the fan cover
Abnormal noise	Bearings damaged or poorly lubricated or defective	Check the wear of the bearings (especially for sealed bearings) and the lubrication
High vibrations	Support structure unsuitable	Alter the natural frequency of the support by adding weights