



## Motors series O-M

### Safety, installing maintenance instructions

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## 1. GENERAL SAFETY INSTRUCTIONS

**⚠️ Ex** These security instructions refer to the installation, utilization and maintenance of motors EL-EX series to be used in potentially explosive areas with presence of combustible GAS and/or DUST. The information of these instructions are only for qualified personnel. Except for the opening of terminal cover, any other opening cancels the warranty conditions of the motors. Here below you can see the different markings of the motors and the different zones where they can be used:

GAS	II 2G Ex d II T3	Tamb -40°C , +60°C	Zones 1, 2
	II 2G Ex d II T4	Tamb -40°C , +50°C	
	II 2G Ex d II T5	Tamb -40°C , +40°C	
	II 2G Ex de II T3	Tamb -40°C , +60°C	
	II 2G Ex de II T4	Tamb -40°C , +50°C	
DUST	II 2D Ex ID A21 IP65 T125°C	Tamb -40°C , +50°C	Zones 21, 22

The motors comply with the Essential Health and Safety Requirements for potentially explosive atmospheres provided by European Standards: EN 60079-0 (2006), EN 60079-1 (2007), EN 60079-7 (2007), EN61241-0 (2006), EN 61241-1 (2004)

**⚠️** Electric rotating machines present dangers from live and rotating parts, and probably very hot surfaces. All work on them including transportation , connection , commissioning and maintenance must be by qualified and responsible specialists ( IEC 364 must be observed). Inadequate work can lead to severe damage to persons and property.

**⚠️** It is imperative to observe the data printed on the nameplate before operating the motor. Low voltage motors are components to be installed into machines in accordance with Directive 98/37/EC. Commissioning is not allowed until the conformity of the end product with this directive has been established. These asynchronous motors comply the EMC (2004/108/EC) Directive and no particular shielding is necessary when connected to a pure sinewave voltage supply.

**⚠️** Before working on the motor, ensure it has stopped and is disconnected from the power supply (including auxiliary equipment). If there is any form of automatic starting, automatic resetting, relays or remote starting, avoid any possibility of unexpected re-starting, paying attention to specific recommendations on equipment application.

## 2. TRANSPORT, STORAGE

**⚠️** On receipt verify that the motor has not been damaged during transport and in this case avoid any installation and communicate immediately to the transport service.

Eyebolts, when provided with the motor, must be tightened properly as they are suitable only for lifting the motor, no additional loads are allowed to be attached. If necessary use sufficiently dimensioned devices as a means of transport.

Do not use any projection of the motor body to hang the motor for transport purposes.

If two eyebolts are present on the motor use both for lifting.  
Store low voltage motors in a dry, dust free and low vibration ( $v_{eff} < 0,2 \text{ mm/s}$ ) area to prevent bearing damage. Before commissioning, the insulation resistance must be measured. In case of values  $< 1,5 \text{ M}\Omega$  the winding must be dried. Contact our technical department directly for information on the drying procedure.

## 3. INSTALLATION

**⚠️ Ex** Installation must comply with the rules of the standard EN 60079-14 or with the national standards (edition into effect).

Before the installation in an explosive atmosphere, the installer must ensure that the motor is suitable for the classified area in consideration of the different inflammable substances present in the installation area (**please verify the marking on the motor plate before installation**).

The motor must be installed only by qualified people with knowledge about electrical apparatus for explosive gas atmospheres and electrical installations in hazardous areas and has to be done with the motor and driven machine at standstill, electrically dead and locked against restart.

The rating on the nameplate corresponds to voltage and frequency of the power supply and all other electrical and mechanical data, as well as the safety data regarding the motor (protection type, temperature class, ambient temperature etc.).

The rotor has been balanced dynamically with a half key fitted. The coupling components must also be balanced with a half key on a smooth mandrel. Coupling belts and pulleys must be assembled by suitable tools to protect the bearings.

After assembly check that the coupling components are well fixed on the shaft end; they must be properly pushed against the shaft shoulder. Where the hub of the coupling gear is shorter than the shaft end, compensate the difference by use of a bush spacer.

Too large or too small pulleys can impair the shaft bearing life; similarly excessive belt tension can cause low bearing life or shaft breakage.

The motors must be installed in a proper position so that cooling air can go in and out easily. The ventilation must not be hindered and the outgoing air - also from adjacent units - must not be directly sucked in again. To keep a good cooling of the motor, there must be a minimum distance of 40mm between the fan cover and another element capable to reduce the air aspiration of the ventilation. Avoid heat sources near the motor that might affect the temperatures both of cooling air and of the motor.

In case of outdoor installation protect the motor from solar radiation and extremes of weather.

It is advisable to protect the motor with such as overcurrent devices and torque limiters where it is not protected by winding temperature transducers connected to appropriate switchgear.

In case of environments with wide thermal excursions and when can be preview the presence of moisture, Elprom will equip the motor with heaters.

**⚠️** Check the direction of rotation with the motor not coupled fastening the shaft key to avoid its violent ejection during rotation.

If the direction of rotation is not as desired, disconnect the motor and wait until the motor is completely stopped:

- in case of three phase motors interchange two phases at the terminals.
- in case of single phase motors refer to the diagram supplied with the motor

### Cable entries

**⚠️ Ex** Depending on the type of protection of the motor the cable entries shall comply with the standards written in the table and having the range of temperature of the motor itself:

	Type of protection	Tamb	Standard
GAS	Ex e	-40°C , +60°C	EN 60079-0 EN 60079-7
	Ex d	-40°C , +60°C	EN 60079-0 EN 60079-1
DUST	Ex ID A21 IP66	-40°C , +50°C	EN 61241-0 EN 61241-1

The cable glands shall be completely screwed to the motor.

As the feet are can be mounted on the frame it is possible to fix them in 3 different positions so to have the possibility to have the terminal box on the top or on the right and left sides of the motor (see picture 1)

At the same time the terminal box can be mounted on the motor so to have the cable entries where it is necessary. So the cable entries can be in the four different positions.

### Connection to the power supply

**⚠️ Ex** Only qualified people are allowed to connect the motor to the power supply.

The connection to the electric supply must be done by through the cable entry supplied with the motor or through another type of cable entry certified in accordance with the European Standards showed above in compliance with Directive ATEX 94/9/EC.

In case of motor complete with cable, the free end of the cable should be connected in a safe zone or inside an Ex enclosure with a type of protection suitable for the explosive atmosphere.

**⚠️** Always refer to the data printed on the nameplate for voltage and frequency to ensure the motor is appropriate for the mains supply.

If not specified it is possible to assume tolerances of  $\pm 5\%$  on voltage and  $\pm 1\%$  on frequency indicated on the nameplate.

The connection diagrams are normally supplied together with the motor or are printed in the terminal box. If they are missing please refer to this manual or contact directly to our technical office.

Check and make sure that, in the case of star/delta start, the switching from star to delta can only be executed after the starting current of the star step has fallen; this is important because of the risk of not allowed operational loads.

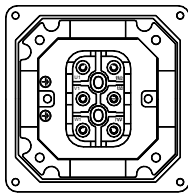
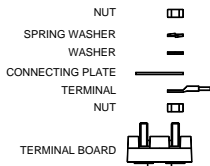
The cable size choice must be suitable to the motor ratings and the plant type.

The motors shall be protected by a tripping device, which in case of breakdown could cut off the power supply before the surface temperature exceeds the ignition temperature of the explosive atmosphere.

**⚠️ Ex** The motors with increased safety terminal box (Ex e) are built with a special terminal board with improved insulation and distances.

**⚠️ Ex** The Ex d motors have a normal terminal board.

The power connection shall be made as in the picture. The nuts shall have to be tightened enough so to avoid any loosening.



Thread	M4	M5	M6	M8
Tightening Torque (Nm)	1,5	2	3	6

**IMPORTANT: Motors with Ex e terminal box REPLACE THE GASKET (SEAL) IN THE RIGHT POSITION BEFORE CLOSING THE TERMINAL BOX AND SCREW COMPLETELY ALL THE SCREWS.**

#### Earth connection

**⚠** In addition to the earth screw terminal fitted inside the terminal box, another external one must be on the motor frame. If the line conductors have a section S the earth connections have to be:

earth conductor	Line conductors
= S	$S \leq 16 \text{ mm}^2$
16	$16 \text{ mm}^2 < S \leq 35 \text{ mm}^2$
$\geq 0,5 S$	$S > 35 \text{ mm}^2$

#### Connection of auxiliary cables (Ex e terminal box)

**⚠** If the motor is provided with terminal board with auxiliary pins the connection of thermal protection and/or heaters can be made in such pins. If the motor is provided with just a terminal board having just the 6 mains pins the connection of thermal protection and heaters have to be made by welding the wires of auxiliary devices with the wires of the cable and insulate using a heat-shrink sheath.

#### Thermal protection

**⚠** The motor must be protected by a tripping device that in case of breakdown, cut off the supply of the motor so that the surface temperature of the parts in contact with the explosive atmosphere doesn't reach the ignition temperature.

#### Motori Alimentati tramite inverter

**⚠** In case the motors are supplied by inverter, they shall be provided with PTC thermistors, inside the windings, capable of assuring the respect of temperature class limits. Such devices shall be connected to a control device able to cut off power to the motor in case of reaching of the limit temperature.

#### Heaters

**⚠** The heaters shall be supplied only when the motor is not under power.

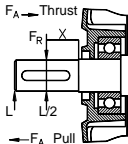
**⚠** Education instructions are usually given to people in charge to use machines in potentially explosive atmospheres.

**⚠** The supply voltage tolerance is  $\pm 5\%$  the values written on the label.

#### Permissible load

Assuming a life-span of 20.000h for 2P motors and 40.000h for 4,6,8P motors:

Motor size	Bearings	Max radial load in L/2	Max axial load (Thrust)	Max axial load (Pull)
63	6202-ZZ	356	240	110
71	6202-ZZ	356	300	140
80	6204-ZZ	580	400	190
90	6205-ZZ	639	430	200
100	6206-ZZ	881	440	200
112	6306-ZZ	1325	620	290



## 4. MARKING

<b>CE</b>	Marking of conformity to the European Directives	
<b>Ex</b>	Specific marking of explosion protection	
<b>II</b>	Motor for surface plants (different from mines)	
<b>2</b>	Category 2: high level of protection	
<b>GAS</b>	<b>G</b>	explosive atmosphere due to presence of combustible gas vapour or mist
	<b>Ex d</b>	Flameproof motor and terminal box
	<b>Ex de</b>	Flameproof motor, increased safety terminal box
	<b>IIC</b>	Gas group, suitable for IIB and IIA
<b>DUST</b>	<b>T3, T4</b>	Temperature class
	<b>D</b>	explosive atmosphere due to presence of combustible dust
	<b>Ex tD A21</b>	tD enclosures method A suitable for zone 21 (cat. 2D)
	<b>IP66</b>	IP degree of protection for conductive dust (at least IP6X)
<b>AB xx ATEX yyy</b>	AB : laboratory which issues the CE type certificate xx : year of issue of certificate yyy : number of CE type certificate	
<b>ZZZZ</b>	Notified Body that gives the Product Quality Assurance Notification	

## 5. MAINTENANCE AND REPAIR

**⚠** **MAINTENANCE** shall be performed only by qualified people in accordance with the standard EN 60079-17 or national standards (last edition). Qualified people must have knowledge about electrical apparatus for explosive atmospheres and electrical installations in hazardous areas.

- Every 3000 hours of service verify and restore, if necessary, the grease on the radial seals (V-rings).

Periodically (depending on the environment and duty) verify:

- motor cleanliness (oil, DUST, dirt and machining residuals absence) and free passage of cooling air
- correct tightening of electrical connections, of fastening screws
- free motor running with low vibration ( $v_{\text{eff}} < 3,5 \text{ mm/s}$  for  $P_n < 15 \text{ kW}$   $v_{\text{eff}} < 4,5 \text{ mm/s}$  for  $P_n > 15 \text{ kW}$ ) and absence of anomalous noises; where there is high vibration and/or noise verify the motor fastenings, machine balancing and that the bearings are in good condition.

**⚠** **REPAIRS** shall be made in accordance with the rules as defined in EN 60079-19 standard.

These repairs can only be done under the control and authorization of ELPROM or by certified repair workshop.

When the repair is made by a certified repair workshop, they must respect all the original characteristic of the motor and use only original spare parts. Furthermore they have to place an additional nameplate on the motor with written a symbol to identify the repair, company name and certification, repair operation number and date.

Nothing regarding the type of protection can be modified.

In case all these rules are not respected, the motor loses all its characteristic of certification.

## 6. MODULAR COMPONENTS

The motors are completely modular.

Feet and flanges can be mounted without affecting the ATEX certificate, as they are external and are not part of the type of protection.

In the table here below we show you the screws to be used to mount the different modular components.

Motor size	Flanges	feet	Terminal box Cover	Shields
63	M5x16	M6x16	M5x16	M5 x 20
71	M5x16	M6x16	M5x16	M5 x 20
80	M6x20	M6x20	M5x16	M5 x 25
90	M6x20	M8x20	M5x16	M6 x 25
100	M8x20	M8x30 NUT M8	M5x16	M6 x 25
112	M8x20	M8x35 NUT M8	M5x16	M8 x 30
Screw quality 8.8				