Installation, commissioning, maintenance

General conditions

The electric motor is a component that is a source of risks mainly of electrical origin. Therefore, if used improperly it can create dangerous conditions and cause damage to persons, animals and property.
It is recommended to read the following instructions carefully before commissioning the motor. All installation, commissioning, maintenance and protection of the electric motor must be done by qualified personnel in compliance with all current legislative regulations and technical standards as well as safety rules for the electrical equipment of machinery in accordance with the European reference standard EN60204-1.
Remember that this documentation must be integrated and does not substitute any legislative regulation, technical standard, or safety rule concerning the electric motor. The following information provides only tips of a practical nature for the skilled personnel assigned to this task. We disclaim all responsibility deriving from improper use and failure to comply with the EEC safety directives regarding electrical material.

Pre-installation

- Check that the motor has not been damaged during transit. Remove any locks or protection used for transportation (e.g., drive shaft output end protection). Check that the shaft turns freely in its seat (except for the brake motors in the series TB, DB, SB for which this check is only possible if the brake release lever is fitted, in which case pull the lever and perform the check).
- Insulation resistance test: if the motor has been stored in a damp place and/or where there is a wide temperature range, check the insulation resistance between the conductors of the power circuit and the protection circuit. If the motor is fitted with holes to drain off condensation, remove the caps, let the condensation flow out, then put the caps back on (remember that without the caps the IP protection degree shown on the plate is lessened, therefore the motor may no longer be suitable for its designated use). In the case of places where it is suspected moisture may form in the windings, periodically drain off the condensation also after installing and commissioning the motor; this must be done with the motor stationary and the supply mains visibly disconnected.

The insulation resistance must be measured by applying a continuous voltage of 500V, as shown in the figure; the value measured must be no lower than 1MW.
To avoid the risk of electrical shock, the windings must be discharged straight after making the measurement. If the test turns out to be negative, the winding is too damp and needs to be dried in an oven. It is recommended to call our technical service before taking any action.

- Rated data: carefully read all the data given on the motor name plate (voltage, frequency, power, rotation speed, input, ambient conditions, etc.) so as to check the congruity between the specifications of the electric motor and the industrial application it has been designated for.

Installation

- It is recommended to secure the electric motor in the envisaged position appropriately and with the right tools according to the weight, type of mounting and version. The motor sizes and construction types are standardised, in accordance with IEC72-1. To avoid damage to the bearings in the case of fitting coupling members (pulleys, half-couplings, pinions, etc.) it is recommended to cushion impact by supporting the shaft on the opposite side to the coupling after taking off the fan cover. It is recommended to take care over alignment in the case of direct coupling and the parallelism of the motor axis with the driven pulley in the case of belt coupling. Tension the belts according to the supplier's instructions, taking care not to exceed the maximum radial loads on the bearings given in the product catalogue (belt tension that is too great can damage the bearings and lead to the drive shaft breaking).
- The electrical motor can work at any angle to the plane of the ground of reference: mounting is preferable with the cooling fan, if any, facing the ground.
- The drive shaft is dynamically balanced complete with half a key, as of size m80.
- During installation, when lifting the motor vertically, avoid rotation with no control and, in the case of lifting with other assembled equipment, do not use only the lifting points of the motor.
- Additional rules: each motor and its machine coupling devices must be mounted so as to be adequately protected and easily accessible for inspection, maintenance, adjustment and alignment, lubrication and replacement. The motor must be mounted so that all its fixing apparatus can be removed and the connection boxes are accessible. The motor needs to be mounted to ensure correct cooling and so that the over-temperature of the windings remains within the limits of the insulation class (IEC34-1) shown on the name plate. The motor compartments must, as far as possible, be clean and dry and, if required, they need to be directly ventilated towards the outside of the machine. The ventilation openings need to be such as to limit entry of shavings, dust or splashes of water to an acceptable level. The mobile elements associated with motors that are hazardous must be protected or enclosed so as to decrease the risk.
- Motor name plate: if the motor is mounted so that the plate is not decipherable, another one must be fitted where it can easily be seen, as close as possible to the motor. A second plate must also be fitted when the nominal specifications given on the motor name plate are modified in relation to ambient or operating conditions.
- Accident-prevention rules: the electric motor must be installed and used by qualified personnel who are aware of the safety requirements.
- The accident-prevention equipment necessary to prevent accidents when mounting or running the motor on the plant or equipment must be in compliance with the current accident-prevention rules.

Commissioning

- Connection to the supply mains: make the connections to the terminal board according to the diagram on the inside of the box. Put the cover back on, carefully refitting the unions and closing the terminal box. If it is necessary to direct cable entry differently to the envisaged manner, it is possible to swap over the cap and cable clamp, unscrewing them, to enable cable entry at 180° to the original situation. Cable entries not used must stay closed in order to keep the IP protection degree of the motor.

Besides the winding and ground terminals, the terminal box can contain connections for thermistors, anti-condensation heaters, and resistors. The connection diagrams for auxiliary circuits are located inside the terminal box. When there are anti-condensation heaters, make sure they are not powered when the motor is running.

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- Supply cables: the connections should be made choosing suitable cables and conductors, as regards capacity and insulation, for the functions they are designated for, taking account of the ambient conditions of operation (ambient temperature, presence of water or corrosive substances, mechanical stress, etc.). If possible, insulated conductors and fire-retardant cables should be used. In particular, the circuits with a safety function must be capable of working as long as possible even in the event of fire. The wiring must be done safely, taking special care over the connections, which must be easily accessible and made so they cannot come loose (EN60204-1).

The cable cross-section, according to EN60204-1, must be chosen so as to limit any drop in voltage and in compliance with the thermal stress the cable may be subjected to in the event of a fault. Refer to the current standards.

- Earth connection: earthing must be done using cable of suitable cross-section and colour, in accordance with EN60204-1, connected directly to the terminal marked with the ⏚ symbol located inside the box in a visible position to the side of the terminal board. On the outside of the casing there is a fitting for another terminal, also marked with the grounding symbol.
- Check the direction of rotation of the motor. If the motor needs to run in the opposite direction to the predefined one, in the case of a three-phase motor it is necessary to swap over two supply phases, in the case of a single-phase motor it is necessary to follow the instructions given on the wiring diagram.

It is absolutely prohibited, for any type of motor, to reverse the direction of rotation by altering the internal connections of the motor at its terminals on the terminal board; these connections must remain unchanged.

When provision is made to brake a motor by reversing the current, it is necessary to take precautions to prevent reversing the direction of rotation at the end of braking, if this reversal may be hazardous.

When safety depends on the direction of rotation, it is necessary to take precautions to prevent operation in the opposite direction due, for example, to phase inversion. If the reversal in the direction of rotation is dangerous or prevents the machine operating correctly, an arrow must be affixed on the motor or immediately nearby showing the correct direction of rotation. The standard electric motor has a bidirectional fan with radial blades, if the motor has a unidirectional fan, the indication of the correct direction of rotation is given on the fan cover.

- It is recommended not to start up the electric motor with the key free since it could get flung by the centrifugal force generated by the rotation of the shaft.
- During operation, the motor enclosure, within the range of its insulation class, may reach high temperatures (>50°C). Therefore, do not touch the motor case and, also after stopping, wait as long as necessary to allow the surface temperature to decrease. It is possible to apply protection preventing direct contact with the motor casing.

Electric motor protection

- All electrical equipment must be protected against damage deriving from faults or faulty operation. The phenomena that need to be taken into consideration comprise:
- over-current deriving from short-circuiting;
- overload currents;
- break or decrease in supply voltage;
- excessive speed of elements of the machines.

For safety, moreover, it is necessary to have protection against direct contact with live parts or indirect contact with parts not normally live but which could become live in the event of faulty insulation.

- Co-ordination and selectivity of all protection must be ensured to protect lines and equipment adequately. It is always and anyhow prohibited to reset the protection automatically after it has tripped since this may be dangerous. In addition, trained personnel must manually reset the system the motor belongs to or is the main part of. When there is a neutral conductor, the protection on the various conductors must take into account the type of connection (system) used.

Maintenance

- Before doing any work on or nearby the motor, see its power supply is disconnected from the power network. In addition, wait for all the masses to have come to a stop. Check restarting is not possible by the shaft getting dragged or by other masses in movement.
- General inspection:
- Inspect the motor at regular intervals;
- Remove any deposits of dust, oil, or dirt from the fan cover side in order to maintain good ventilation and enable the motor to cool correctly;
- Check the conditions of the oil seal and V-ring;
- Check the conditions of the electrical and mechanical connections and of the fixing and foundation bolts;
- Check the conditions of the bearings, paying attention to any abnormal noise or vibration.

If it were necessary to strip down the motor and access its internal parts, this requires qualified personnel, using appropriate tools and methods. In any case, the company shall not be held responsible for parts worked on if this is not done by authorized personnel.

Instructions:

1 -**Disassemble the motor:** Free the motor from its couplings with the operating part. Take off the fan cover and fan, removing the relative fixing parts. Remove the key. Unscrew and remove the screw tie bars keeping the motor assembled. Take out the flange or front shield, extracting it from the casing and from the bearing. Extract the rotor from the support of the opposite shield, taking care not to damage the winding.

2 -**Replacing bearings:** Extract the bearings with a special extractor. New bearings must be mounted using a press or buffer resting on the inside ring, or using the hot method. Pre-lubricated shielded bearings that do not require greasing are envisaged for every kind of motor.

3 -**Stator rewinding:** to be done only by qualified workshops.

4 -**Assembly:** This is done in reverse order to that of disassembly. The only warning is to take care when mounting the oil seal on the cap, after cleaning its seat and turning the ring correctly with its concave surface facing outwards.

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Storage

- The motors must be kept in a temperature, dry, clean environment, sheltered from the weather. There must be suitable provision to prevent damage caused by moisture, vibration and impact. The surfaces of the motor that are not protected (end of shaft and flanges) must be treated with corrosion-proof paint or greased. Any anti-condensation heaters must preferably be kept powered.

Spare parts

- Order spare parts for the motor accurately stating the type of motor, product code and serial number as stamped on the motor name plate. See the exploded view of the motor.

Compliants

- In the event of a breakdown, the right to repair under warranty is granted depending on: expiry of term of warranty, correct handling and installation, integrity of manufacturer's assembly prior to the work done by authorized personnel.

The Customer is responsible for making sure that these instructions are brought to the knowledge of the installers and/or users of the motors. In the event of doubt or for any other reason whatsoever, you can call our technical service.