

## IEC Squirrel Cage Motors

Safety-related operational startup notes V1.04

# Safety-related operational startup notes

### 1. General

Electric motors have dangerous, live and rotating parts, as well as possible hot surfaces. All work relating to transport, connection, operational startup and regular maintenance is to be implemented by **qualified, responsible and specialist personnel** (note VDE 0105; IEC 364). Inappropriate action can cause serious **personal injuries and property damage**. The national, local and **system-specific stipulations and requirements** applicable in each case are to be considered.

### 2. Use according to specification

These motors are determined for commercial systems. They correspond to the harmonized standards of the series **EN 60034 (VDE 0530)**. Their employment **in explosion-hazard areas is prohibited**, provided that they are not designed **explicitly** for such use (consider additional notes). If, in the special case (with employment in non-commercial systems), increased demands are placed (e.g. contact protection against children's fingers), these conditions are to be guaranteed system-sided with installation.

The motors are rated for ambient temperatures from **-20°C to +40°C** (2 KG: -10°C to +40°C), as well as installation elevations **< 1000 m** above MSL. **It is absolutely necessary** to consider any different information given on the rating plate. The conditions at the application location must correspond to **all** rating plate information.

Low-voltage motors are components for installation in machines as specified by the Machinery Directive 2006/42/EG. Operational startup is prohibited until conformity of the finished product with this directive has been determined (note EN 60204-1).

### 3. Transport and storage

After delivery, any damages determined are to be immediately communicated to the transportation company; the operational startup is to be excluded as appropriate. With transport, **all** existing lifting lugs on the motor are to be used, and screwed-in elements tightened securely! They are designed for the **weight of the motor** only, not for attaching any additional loads. If necessary, employ suitable, sufficiently-dimensioned transport resources (e.g. cable guides). **Remove existing transport protections** before operational startup. Employ new resources for further transports.

If the motors are stored, ensure a **dry, dust-free and low-vibration** ( $v_{eff} \leq 0.2$  mm/s) environment (standstill bearing damage).

In case of longer **storage time**, the grease useful life of the bearings decreases. In case of storage over 12 months, verification of the grease condition is to be carried out. If the verification identifies any dirt accumulation in the grease (intrusion of condensate water leads to consistency changes in the grease), the grease must be replaced.

#### Insulation resistance

The **minimum insulation resistance** to ground of new, cleaned or repaired windings is 10 MΩ. Measure the **insulation resistance** before operational startup.

In case of rated voltage values  $\leq 0.5$  MΩ/kV, dry the windings.

### 4. Installation

Screwed-in lifting lugs are to be securely tightened or removed after the installation!

Note uniform support, good foot and flange mounting and precise alignment in case of direct coupling. Avoid structure-related resonance with rotation frequency and double the mains frequency. Rotate the rotor **manually** and note any unusual grinding noises. **Check** rotation direction in the uncoupled status (note Section 5).

Pull power take-off elements (belt pulley, coupling ...) on and off only with suitable equipment (warm up!) and cover with a contact protection. Avoid inadmissible belt tension (catalog, technical list).

**For the balance state**, see shaft end face or rating plate (**H** = half balancing, **F** = full-feather key balancing, **N** = balancing without key) . With installation, note the balance state of the power take-off elements!

In case of employment or storage in the open air, a superstructure or an additional cover is recommended, so that any long-term influences are avoided in case of direct, intensive solar radiation, rain, snow, ice or also dust.

In case of shaft-end facing up, the intrusion of water along the shaft must be prevented.

**Do not obstruct ventilation!** Exhaust air (also from adjacent aggregates) may not be directly suctioned in again.

All fixing screws, connecting elements and **electrical connections** are to be **tightened** with the prescribed torques and **checked!**

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### 5. Putting into operation

All work may be carried out by **qualified specialist personnel** only, with motor **stopped**, in **isolated** status and secured **against restart**. This applies also for auxiliary circuits (e.g. standstill heating).

Check for voltage-free status!

Exceeding of the tolerances in **EN 60034 - 1 / IEC 34-1** -

Voltage  $\pm 5\%$ , frequency  $\pm 2\%$ , wave form and symmetry increase heating and influence the electromagnetic compatibility. Consider the rating plate information, as well as the schematic diagram in the terminal box.

The connection must be implemented so that a **permanently-secure** electrical connection is maintained (no protruding ends of leads); use assigned cable-end equipping. Establish a secure **ground connection**.

Tightening torque for terminal board connections, see Fig. 1.

**Air spaces** between exposed, live parts with respect to each other and to ground  $\geq 5.5$  mm ( $U_N < 690$  V).

**No** foreign bodies, dirt or moisture may be present in the terminal box. Inlets into the terminal box (see DIN 42925) and any further open inlets are to be sealed off with O-rings or suitable flat seals, and the terminal box itself is to be sealed **dust-resistant** and **water-tight** with the original seal.

Tightening torques for cable gland connections, see Fig. 2.1; for other screws, see Fig. 3.

**Secure the key** for test phase operation without power take-off elements. In case of motors with brakes, check the trouble-free function of the brakes before operational startup.

### 6. Operation

In case of changes with respect to normal operation (e.g. **increased temperatures, noises, vibrations**), the motor is to be switched off **in case of doubt**. Determine the causes and possibly hold a return discussion with the manufacturer. Do not take safety devices out of operation, also in test phase operation.

Clean airways regularly in case of the presence of severe dirt. Open the existing sealed **condensate water holes** from time to time!

Independent of the operating hours of a motor in use, the roller bearing should be renewed approximately every 3 years because of the reduction of the lubrication capability.

In case of motors **without relubrication equipment**, carry out bearing and grease changes according to manufacturer's directives, however at the latest after 3 years.

In case of **motors with relubrication equipment**, the specifications on the lubrication instruction plate or rating plate are to be considered! The relubrication should be implemented with motor running!

In case of motors with cylindrical roller bearing for increased radial loading, damage is caused through operation with radial loading levels less than the minimum. The radial loading in operation should be at least 30% of the permissible radial loading. In case of motors with external ventilation, the external ventilator must be switched on with operation.

### 7. Further information

Information about possible supplementary equipment is to be considered, such as e.g. various notes of the manufacturers regarding cable gland connections, including sealing elements! Further details include our full operation and maintenance directions. They can be sent to you on request, with specification of the type and the machine no, or they can be viewed at [lammers.de](http://lammers.de)

These safety and operational startup notes are to be complied with to!