

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** ($v_{\text{eff}} \leq 0.2$ 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 ≤ 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. Transport and storage

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 ≥ 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 www.lammers.de.

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

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Maintenance Instructions V1.05

Maintenance Instructions

1. General information

1.1. General

Work on electrical drives may be carried out by authorized specialist personnel only. All notes refer to standard motors in standard conditions in standard applications. In case of deviations, the specifications are to be correspondingly adapted.

1.2. Notes on safety

CAUTION

Before any work, it must be ensured that the drive is disconnected according to regulations (main, auxiliary and additional electrical circuits).

Drives or parts can reach temperatures > 50°C. The temperature must be checked.

Personal protective equipment is to be worn corresponding to circumstances (protective goggles ...)

In the case of cleaning agents, the directions for use are to be considered. Chemical agents must be compatible with the component parts of the machine.

2. Maintenance intervals

2.1. General

Thorough and regular maintenance work is necessary in order to identify faults at an early stage, and thus avoid ensuing damage.

Since the operating conditions and operating mode (e.g. FU operation) are very different, only general notice periods can be indicated with trouble-free operation. The maintenance intervals must therefore be adapted to local factors and the operating mode.

If condensate water openings are present, these must be opened at regular intervals according to climatic conditions.

2.2. Intervals

First inspection	->	After 500 operating hours	->	At the latest, after ½ year
Lubricating	->	See lubrication instruction plate		
Cleaning	->	According to local degree of contamination		
Main inspection	->	Approx. every 16,000 operating hours	->	At the latest, after 2 years
Cleaning				
- Possibly existing old-grease accumulation chambers and lubrication channels (with relubrication)				
- Cooling air paths	->	Cooling fins etc.		

2.3. First inspection

- Visual inspection
- Check the following when running:
 - That electric characteristic parameters are adhered to
 - That permissible temperatures in the bearing are not exceeded
 - That quiet running and bearing noises have not become worse
- Check the following at standstill:
 - No subsidence and cracks in the foundation
 - Secure seating of the nuts on the terminal studs (upper and lower nuts)
- Further tests are additionally necessary in case of special system-specific conditions

2.4. Main inspection (1x annually)

- Visual inspection
- Check the following when running:
 - That electric characteristic parameters are adhered to
 - That permissible temperatures in the bearing are not exceeded
 - That quiet running and bearing noises have not become worse

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- Check the following at standstill:
 - No subsidence and cracks in the foundation
 - Secure seating of the nuts on the terminal studs (upper and lower nuts)
 - That the alignment of the three-phase AC current machine is within permissible tolerances
 - That all fixing screws (for mechanical and electric connections) are securely tightened
 - That the insulation resistance values of the windings are sufficiently large
 - That lines and insulated parts are in proper condition and do not indicate any discoloration
- Further tests are additionally necessary with special system-specific conditions

3. Bearing support

The drives are equipped with roller bearings and grease lubrication. Above design size 280, relubrication equipment is available as standard, and is optional below this.

Only general notice periods can be indicated for the service life and relubrication. The operating hours are reduced in case of vertical machine installation, large vibration loading, frequent reverse operation, higher coolant temperature, higher rotation speeds etc. In case of a temperature increase of 10°C, this is halved e.g. the grease useful life and the relubrication schedule (relubrication schedules and grease useful life apply up to 40°C).

In case of longer storage time, the grease useful life of the bearing decreases. In case of permanent-lubrication bearings, the bearing service life decreases. A bearing replacement is recommended after a storage time of 12 months. After a storage time of 4 years, the bearing must be replaced.

3.1. Permanent-lubrication bearings

Motors with permanent-lubrication bearings have a recommended bearing replacement time under normal conditions as follows:

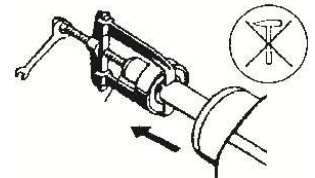
- KT 40°C, horizontal coupling operation -> 40,000 h
- KT 40°C, with axial and radial forces -> 20,000 h

The grease of the new bearing must have the following qualities and properties:

Motor heat class according to VDE 0530	Motor cooling temperature	Grease type of the bearing lubrication
F	-20... + 40°C	DIN 51825-K3N

e.g. UNIREX N3 from ESSO (according to manufacturer: Run test B, in accordance with DIN 51806, passed at testing temperature +160°C)

The pulling off of roller bearings is basically to be implemented with a suitable pull-off device. We recommend a distance plate for the protection of the centering in the shaft end. To pull on the new bearing, this must be uniformly warmed up to approx. 80 - 100°C beforehand. Hard impacts (e.g. with a hammer, ...) are to be avoided.



Adjacent grease supply spaces are provided with a grease filling (e.g. in general 2/3 filled in the end shield for the purpose of sealing the shaft bore). The same grease type is to be provided for this as in the bearing. The mixing of different grease types is to be avoided.

NOTE: With replacement of the bearing, it is also recommended to renew sealing which is possibly existing and subject to wear (e.g. radial shaft seal).

Damaged parts are to be replaced by new items.

3.2. Bearings with relubrication equipment

In case of motors with relubrication equipment, relubrication schedules, grease quantity and grease type are to be taken from the rating plate or lubrication instruction plate.

In case of a storage time of more than 12 months, verification of the grease quality is to be carried out. If any de-oiling or dirt accumulation can be determined, relubrication must be carried out directly before the operational startup.

Lubricating:

- Clean the lubrication nipples (drive and non-drive side)
- Press in the prescribed grease with the quantity as specified in accordance with rating plate information, with machine running

Note: The bearing temperature first increases and later decreases to a normal value after the surplus grease has been forced out.

After approx. 4-6 relubrication operations, the bearing, lubrication channels and grease chambers must be cleaned of old grease. The ball bearing should be checked.