Kaiser-Motoren

General operation manual

induction cage-motors

Contents

General

Intended use

The motors are to be operated only according to the data specified on the rating plate.
The motors are suitable for installation within another machine. Start-up is forbidden until the conformity of the final product with Directive 89/392/EEC as amended by 98/37/EC is determined.

Target audience

This manual is addressed to the specialists in charge of installing, operating and servicing the motors.

Liability and Warranty Guarantee

We cannot be held liable for any damage or malfunctions resulting from assembly errors, the failure to follow these operating instructions or improper repairs.
Original spare parts are manufactured and tested specifically for these motors.
We recommend that you obtain any spare parts and accessories only from the manufacturer.
We hereby specify that any spare parts and accessories not supplied by the manufacturer require our approval.
Under any circumstances the mounting and use of third-party products can negatively affect the motor's original structural properties and impair the safety for persons, the motor or other real values (explosion protection).
The manufacturer shall not be liable for any damages resulting from the use of spare parts or accessories not authorized by the manufacturer.
Any unauthorized conversions and alterations to the motor shall not be approved for safety reasons and the manufacturer cannot be held liable for any resulting damages.

Any independent manufacturing equipment mounted on or built into the motors like brakes, encoders force ventilation units or frequency converters, etc. have their own operating instructions which are to be duly followed.

Warning!
Hazardous electrical current!

Before installing

- Switch off the power to the device.
- Make sure that device cannot be switched on again by accident.
- Make sure that the device is deenergized.
- Connect to earth and short out.
- Cover or close off any neighbouring live parts with a barrier.
- Follow carefully the assembly instructions provided for the device.
- The electrical connections are to be made as per the relevant specifications (e.g. cross-section of the supply line, fuses, protective connection).
- Opening the motor - save for the terminal box - during the warranty period without the manufacturer's permission shall lead to the termination of the warranty.
- Original spare parts are to be used for the approved repairs or repairs not falling under the warranty.
- Live and rotating parts of electrical motors can cause major or deadly injuries.
- Any shipping, installation, start-up and maintenance works are to be carried out only by qualified personnel.
- The personnel must be duly instructed to proceed with caution and according to regulations during shipping, hoisting, and positioning and while repairing the motor.
- Do not lift the motor together with the drive equipment by the motor lifting eyebolts.
- In the case of motors with built-in brake appropriate safety measures are to be adopted against the possible failure of the brake especially in applications involving the pulling of loads.
- Contact with the capacitor for the start up and running of single-phase motors is to be avoided until the unloading procedure is carried out securely.
- If a high-voltage test is necessary, the procedures and precautionary measures set forth in accident prevention regulations as well as the regulations of EN60034-1 are to be followed.
- Based on special application/duty/cooling some types of motor may have encreased surface temperature i.e.
  - nonventilated motors
  - torque motors
  - variable speed motors

  On part of operator special features may be necessary
  - protections devices to hot surface
  - special cables suitable for encreased temperatures

Delivery, Storage, Transport

Delivery

Check the motor for damages during transportation. In case of damage during transportation an investigation of fault is to be performed by the forwarding agent.
Report any covert damages to the forwarding agent or manufacturer no later than seven days from the transfer of the motor.

Storage

Storage up to a maximum of 36 months is possible in the following conditions:

- In order to prevent a drop in the insulation resistance, the surrounding environment must be dry and dust-free.
- The room temperatures should not drop below +5 °C or exceed +30 °C with an air humidity of < 70 % and register changes in temperature greater than 10 °C/day.
- In order to prevent damage during storage any occurring oscillations must amount to Veff < 0.2 mm/s.
- For motors with regreasing systems repress an amount of grease double that specified on the motor at standstill before storage.

Transport

Do not lift the motor together with mounted driven machines such as, for instance, pumps, gearing, etc. by the motor lifting eyebolts. Do not use eyebolts as per DIN 580 at ambient temperatures lower than –20 °C. At these temperatures the eyebol ts may break and hence injure the personnel and/or damage the machinery. Do not load the eyebolts as per DIN 580 no more than 45° compared to the screwing direction. The use of crossbeams is recommended. Layout dimensions of the lifting eyebolts and the minimum dimensions of the loading crossbeams and chain lengths.

Please note!
When mounting vertical motors from the horizontal position, the shaft must not touch the floor to avoid damaging the bearings.

Installation

Mechanical checks

After removing the shipping braces and shaft blocks, the motor shaft must be rotated by hand. In the case of brake motors the brake needs be vented at standstill (maximum of 10 min). This is to be performed by applying voltage as per the circuit diagram

Site

The TEFC motors are intended for operating sites in which they are exposed to soiling, humidity and other open air conditions as per the relevant degree of protection.
The motors are to be installed in a place with ambient temperatures of –20 °C to a maximum of +40 °C and max. 1000m above sea level. Any permissi ble ambient temperatures (Ta) and heights (MSL) other than those indicated above must be specified on the rating plate.
Please note!
The inlet and outlet of fan cover must not be obstructed, as there is the risk of heating higher than the permissible temperature class and of reducing the lifetime of the winding insulation.
This applies in particular to the use of soundproof covers. The air ducts must checked and cleaned regularly in factories with heavy soiling.
Minimum distance of an obstacle from the air inlet is 25% of inlet-Ø.

Mounting

The motors are mounted at the installation site either on the motor feet or on the flange. All motors with deep groove ball bearings can be mounted either horizontally or vertically. This applies also for motors to be mounted with the feet on roofs and side walls.
Motors with roller bearings need to be operated with a minimum radial load to ensure their smooth operation. The bearings may be damaged if the minimum load is exceeded. Trial runs with no-load should last only a few minutes.
Guide value for minimum radial load: 20% of accepted rated load (see catalogue or contact manufacturer).
Align the motors according to the requirements of the coupling or pulley manufacturer. The feet are to be positioned evenly and, if necessary, lined.
Please note!
Make sure that the fastening screws are duly dimensioned. Data on the foundation loading generated by the motor can be requested from the manufacturer by specifying the motor number.
The fastening screws must be duly tightened according to their layout and secured to prevent loosening during operation and hence the damaging of the drive.

If the motors are for vertical mounting arrangement, it is necessary to fit an appropriate impact canopy to prevent any foreign bodies from dropping into the driven machine through the air inlet and outlet openings of the fan cover.
Please note!
The flow of cooling air through the motor must not be limited by this canopy.

Balance

The balance of the motors is specified in the shaft key (H = half key, F = full key, N = no key, C = complete balancing i.e. incl. pulley).
The design of balance of the coupling or pulley must match the motor's balance.
Please note!
If balancing is with half key (H), work on the vertical (visible) key components on the shaft diameter or cover these with washers with keyway along the relevant length.
If the coupling is longer than the key, it is necessary to fill the keyway in the remaining part of the coupling.
In case of failure to comply with the foregoing, out-of-balances liable of causing excessive vibrations may occur.
Please note!
Mount the pulleys or couplings only through the threaded bores in the shaft end to avoid damaging the bearings.
Use the utmost care in mounting dynamically balanced pulleys or couplings on the shaft end.
Machines to be connected to the motor by means of couplings are to be aligned according to the specifications of the coupling's manufacturer.

Mains and electrical connections

Any connection need to be done by authorized personnel only.
According EN 60034 the motors need to be driven with mains voltage oscillations of up to ±10% and/or frequency oscillations of up to ±2%. The mains ratings must match the figures of voltage and frequency as specified on the nameplate.
Connect the motors according to the connection diagrams attached in the terminal box. Use only the supplied original connection components.
Please note!
Carry out the motor, controller, overload protection and earthing connection operations in compliance with local installation requirements.
Please note!
If the accidental starting of the system may expose the personnel to danger, do not use any automatically restarting motor protective equipment.

Motors with cables or loose leads

The free end of the cable inserted in the motor must be connected according to the local regulations. If the gland used on the motor is provided with pull relief, the cable can be laid freely, otherwise the cable must be secured with a pull relief device in the near vicinity.
The maximum operating temperature at the line lead-in must not exceed 90°C.

Cable and line lead-ins

Connect the motors with cable and glands.
Any openings that are not used must be closed with sealing plugs.
The supplied sealing plugs for the entries serve only as protection during transportation and are not an approved sealing plug. This applies also for the storage of motors outdoors. In this case additional rain protection is required.
Please note!
The cable and line diameters must comply with the clamping range specified on the gland.
Follow carefully the operating instructions for cable and glands.

Motors with unidirectional fan

Make sure that the fans requested direction of rotation matches that one of the motor.

Motors with forced ventilation unit / water cooled motors

Make sure by means of the electric control that the main motor can be operated only when the forced ventilation unit is running and ensure the correct direction of airstream over the main motor.

The water connections are to be connected according to the signs on the motor. The quantity of cooling water necessary for cooling the motor is to be complied with. Avoid/eliminate any entrapped air, this would reduce the cooling heating and motors temperature would be higher than the permissible temperature class including the risk of reducing the lifetime of the winding insulation. The cooling water quantity control must shut off the motor if there is less cooling water than required. Make sure by means of the electric control that the motor can be operated only with the water flow on and that the water jacket is always perfectly vented. The maximum inflowing water temperature amounts to 40 °C.
The maximum inflowing water temperature amounts to 40 °C.
Please note!
Motors with forced ventilation unit and water cooled motors need to be fitted with thermal control for winding temperature (thermistors) to avoid damage of winding of the cooling device fails.

Motors with space heater

The rating data for the space heater are specified either on the rating plate or on a separate plate.
There are two heating variants:

- Separate heating facilities inside the motor, HE1-HE2 or
- Heating via stator winding by feeding AC voltage to terminals U1-V1.

Please note!
Make sure by means of the electric control that the motor voltage and the heater voltage are not fed simultaneously.

Motors with temperature monitoring

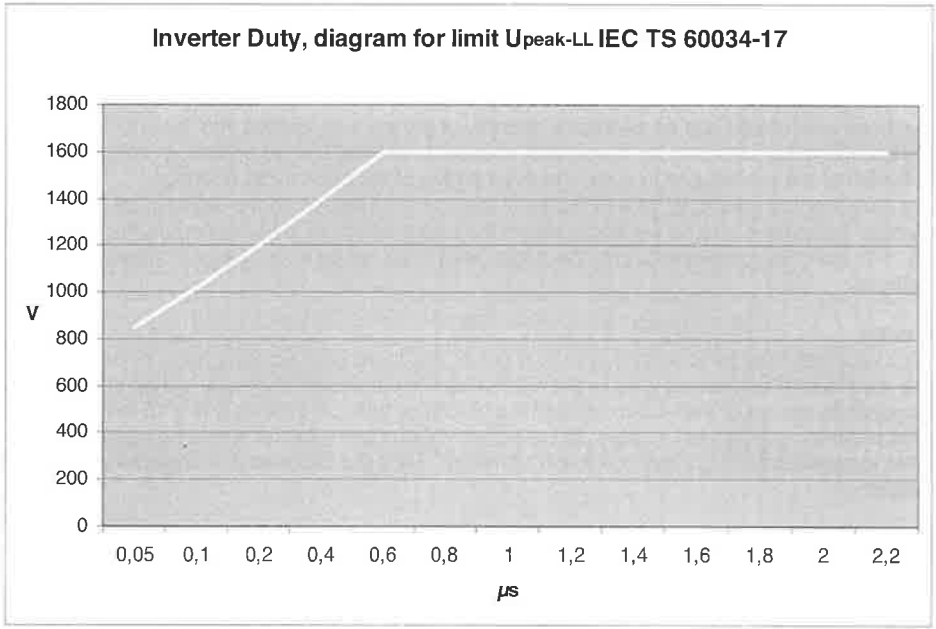
Motors with thermistors PTC, terminals TP1-TP2
The motors would be equipped with PTC's as per DIN EN 60947-8 and DIN 44081/2.
Please note!
Connect the PTC to a tripping device as per DIN EN 60947-8. Any connected voltage >2,5V may destroy the PTC and damage the motor winding.
Motors with thermostats, terminals TB1-TB2
3-phase motors would be equipped with opening on increase of temperature
standard 250VAC 50/60Hz 1,6A.
1-phase motors would be equipped with opening on increase of temperature
standard 250VAC 50/60Hz 9A.
Please note!
If not avoided by connection, automatically restarting of motor after cooling down may happen.

Motors with brake

The connection of the brake is in the motor terminal box or in a separate terminal box. Observe the supplied connection diagram and the rated figures of brake on the rating plate.

Motors for operating on frequency converters

For operating on frequency converters, motors need to be fitted with temperature monitoring.
The rated data for this operating mode are specified either on the rating plate or on a separate plate. Otherwise contact manufacturer.
Check the drive's "electromagnetic compatibility" as per EMC directive no. 89/336/EEC when operating on frequency converters.
Make sure when operating motors on frequency converters that the admissible voltage peak value named below are not exceeded by the periodically occurring commutation voltage peaks (threshold value for terminals and winding insulation):



Special winding
Figures for motors with special winding concerning inverter-duty need to be negotiated between manufacturer and customer.

Start up

Please note!
Before mounting or start-up the insulation resistance is to be measured by qualified technicians. The resistance must be greater than 5 MΩ. If this value is not reached, the motors must be dried. To eliminate any humidity, open the motor, if necessary dry the stator in an oven at temperatures up to 100 °C. To be entitled to any warranty claims , contact the manufacturer in advance.
These works must be carried out by authorised personnel. For the assembly and disassembly, see the relevant repair instructions.

- Check the direction of rotation and operation during no-load running. In case of unidirectional fan observe the sign for the direction of rotation on the motor. If the direction of rotation needs to be changed, invert the two power lines and the fan.
- If the motor was stored and an additional quantity of grease was applied into the anti-friction bearings, the motor needs to be driven with no load for at least 0.5h to ensure an adequate distribution of the grease and to avoid the overheating of the anti-friction bearings.
- Make sure that the operating current matches the specified figures on the rating plate. The protective equipment is to be set according to the motor rating values specified on the rating plate. The specified current value on the rating plate must not be exceeded in continuous duty conditions.

Please note!
Drive the motor with load for at least 1 hour and check that there is no unusual noise or heating. Lubricate motors with regreasing equipment with the specified amount of grease during start-up. Vibration severity values of Veff < 3.5 mm/s (PN ≤15 kW) or Veff < 4.5 mm/s (PN > 15 kW) in coupled operating mode are acceptable. In case of deviations from normal operating conditions – e.g. higher temperatures or greater noise and vibrations – find the cause and, if necessary, contact manufacturer.

Please note!
The protective equipment must always be kept in duty also during trial runs. In case of any doubt switch off the machine.

Maintenance

Inspection

- The motors are to be monitored constantly depending on the operating conditions.
- Keep the motors clean and the ventilation openings free

Lubrication

Please note!
In order to avoid damage the bearings and grease must be kept clean.
The deep groove ball bearings of motors up to frame size 200 are sealed on both sides and filled by the bearing manufacturer with an amount of grease which is enough for normal operating conditions for 4- and multi-pole motors for 40.000 operating hours and for 2-pole motors for 20.000 operating hours.
When replacing the bearings, also replace the shaft seals. To do so, dismount the motor so that the winding can be cleaned as well.
Disassembly and assembly need to be done by authorized personal only.
Motors frame size 180 ref 225 (depending on range) and motors with roller-bearings are equipped with regreasing devices. The bearings are to be regreased preferably at running motor with a grease gun through the grease nipples located at the end shields or bearing caps.
The drip space in the bearing cap for the excess grease is large enough to collect the excess grease during the nominal bearing service life with state-of-the art regreasing.
See the plate on the motor for the specified lubricating intervals and the type and quantity of grease to be used. The manufacturer normally uses Shell alvania G3, a lithium complex soap/mineral oil grease.

Ambient temperature	**Rpm up to 1800 min**–1	**Rpm up to 3600 min**–1
40 °C	4000 h	2000 h

Please note!
In motors with enhanced performance, in heavy drive conditions like belt and gear drive with additional bearing loads and in vertical designs the lubricating intervals are to be reduced by 50%. Observe the specified quantity of grease. Excessive greasing can lead to a sharp increase in the bearing temperature and hence to the failure of the bearing.
If in any doubt please contact the motor manufacturer concerning type/amount of grease and/or interval of regreasing.

Caution!
If regreasing is carried out while the motor is running, provide for adequate protection against rotating parts!

Condensation

Closed breathing holes need to be opened time to time, especially at larger oscillations of ambient temperature and higher humidity. The necessary intervals for opening depend on ambient conditions, so there are no rules concerning this. It is proposed to open the holes in short terms after start up to find individual experience concerning amount of condensation.