



**Allgemeine Betriebsanleitung  
Edelstahlmotoren mit Käfigläufer**

**General Operating Instructions  
Stainless steel induction cage motors**

**Mode d'emploi général  
Moteurs électriques à cage d'écureuil  
en acier inoxydable**

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**General**

**Conventional Application**

The motors are only to be operated according to the ratings stipulated on the nameplate. These electric motors are intended for use in industrial plants. They correspond to the valid standards and regulations:

- Low voltage directive 2014-35-EU

The technical data as well as information on the admissible conditions can be seen on the nameplate and in the documentation.

**All specifications must definitely be observed.**

**Target group**

This manual is focussed on qualified personnel who install, commission and maintain the motors.

**Liability and Warranty**

We assume no liability for damages and operational faults which occur due to assembly faults, a non-observance of these operating instructions or inappropriate repairs. Original spare parts are designed and proven and tested especially for these motors. We recommend to only obtain spare parts and accessories from the manufacturer. We explicitly point out that spare parts and accessories not delivered by us must be approved by the manufacturer.

The installation and application of foreign products can possibly negatively change characteristics of the motor specified by the design and affect the safety for persons, the motor or other characteristic values.

All independent conversions and changes on the motor are not admissible for safety reasons and exclude a liability of the manufacturer for resulting damages.

Independent equipment such as for example incremental encoders which have been attached to or installed in the motors have their own operating instructions which have to be observed.

**Warning!**  
**Dangerous electrical voltage!**

**Before installation**

- De-energize device.
- Secure against switching on.
- Check that the device is de-energized.
- Earth and short-circuit.
- Cover or shield adjacent current-carrying parts.
- The assembly instructions stipulated for the device must be observed.
- The electrical installation is to be carried out acc. to the relevant stipulations (e.g. cable cross-sections, fuses, protective earth conductor connection).
- The opening of the motor, with the exception of the terminal box, during the guarantee period without the consent of the manufacturer, terminates the warranty.
- Original spare parts must be used for approved repairs or repairs outside the warranty.
- Live or rotating parts of electrical machines can cause serious or fatal injuries.
- All transport, installation, commissioning or maintenance work may only be carried out by qualified personnel.
- The personnel must be instructed to act carefully and according to the regulations when transporting, lifting, positioning, re-commissioning and repairing the motor.
- If a further high-voltage test is necessary, the procedure and precautionary measures of the accident prevention regulations and the regulations of the EN60034 T.1 must be followed.
- Special motor designs can possibly have higher surface temperatures due to their construction/type of operation/type of cooling, e.g.
  - non-ventilated motors
  - variable-speed motors
 In this case special measures of the operator could be necessary, e.g.
  - protection against accidental contact with the surface of the motor
  - special cable connections for higher ambient temperatures

**Delivery, Storage**

**Delivery**

Check that the motor has no transport damages. If there are transport damages, a survey of the damage must be carried out by the transport leader. The commissioning must, if necessary, be forbidden.

**Storage**

A storage is possible up to 36 months under the following conditions:

- The surroundings must be dry and free of dust in order to avoid a decrease of the insulating resistance.
- The room temperatures may not exceed, respectively, fall below - 20°C to +40°C with an air humidity of < 70% and a temperature change of maximum 10°C/day.
- In order to avoid storage damages, vibrations which occur must be  $v_{eff} < 0,2 \text{ mm/s}$ .

## Installation

### Mechanical Check

It must be possible to easily manually turn the shaft.

### Site

The motors are designed for factories in which they are exposed to dirt, humidity and normal environmental conditions according to their protection class.

The motors must be positioned in a location with ambient temperatures of -20°C up to maximum +40°C and max. 1000 mm above sea level. Admissible deviating ambient temperatures (Ta) and heights (above sea level) must be stipulated on the nameplate.

#### Attention!

Air inlet and outlet of the fan cover must not be obstructed as otherwise the cooling of the motors is inadmissibly affected and the lifetime of the winding insulation is shortened. This especially applies to the application of noise insulating covers. Moreover the air ways must be regularly checked and cleaned in factories with considerable dirt contamination. In order to enable an unimpeded cooling, the following minimum distances must be observed between the air inlet opening of the fan cover and an obstruction to be found behind the cover: 25% of the diameter of the air inlet opening of the fan cover.

### Mounting

The motors are mounted at the place of installation via the motor feet or the flange. All motors with grooved ball bearings can be mounted horizontally as well as vertically due to their bearing formation. The same applies to motors which are to be mounted on ceilings and side walls with their feet.

Align the motors corresponding to the requirements of the coupling or belt pulley manufacturer. The feet must be solidly seated and, if necessary, lined.

#### Attention!

Pay attention to an adequate dimensioning of the fastening screws. The fastening screws must be tightened and secured according to their layout in order to avoid a loosening during operation and therefore a damaging of the drive. With a vertical arrangement of the motors, with shaft end at the bottom or the top, an entry of foreign particles in the air inlet and air outlet openings of the fan cover must be prevented either through the design of the machine or by a suitable cover.

#### Attention!

The cooling air current of the motor must not be decreased by this cover.

### Balancing

All stainless steel motors are balanced with half a key. The design of the coupling or belt pulley must correspond to the balance condition of the motor.

#### Attention!

With the design with half a key (H), reduce overlapping (visible) key parts by machining corresponding to the shaft diameter. If the coupling is longer than the key, then the key way in the overlapping coupling must be filled in. If this is not observed, unbalances occur in both cases which can lead to inadmissible vibrations.

#### Attention!

Only mount the belt pulleys or couplings by means of the threaded hole in the shaft end.

By striking the pulley onto the shaft, the ball bearings can be damaged. Only mount carefully, dynamically balanced belt pulleys or couplings onto the shaft end. Machines which are connected to the motor via couplings must be aligned corresponding to the specifications of the coupling manufacturer.

### Power Supply and Connections

The connection is to be carried out by a specialist according to the effective safety stipulations.

The relevant construction and operating directives as well as customary, national and international directives must be taken into consideration.

The motors function according to EN 60034-1 with power supply voltage fluctuations of up to  $\pm 10\%$  and/or frequency fluctuations of up to  $\pm 2\%$ . The network data must be in accordance with the voltage and frequency data of the nameplate.

Connect the motors according to the pertaining connection diagram.

#### Attention!

Carry out the connection of the motor, the controls, overload protection and earthing according to the local installation directives.

#### Attention!

Do not use motor protection devices which switch on again automatically where an unexpected starting of the system can put the personnel at risk.

### Cable and glands

Connect the motors with cable and cable glands.

Close openings which are not used with stainless steel blind plugs.

The supplied locking caps of plastic only serve as transport protection and are not permitted locks. This also applies to the storage of the motors outdoors. An additional rain protection is necessary in this case.

#### Attention!

Applied cable and wire diameters must be in accordance with the clamping figures of the used cable gland.

Observe the operating instructions of the cable and cable glands.

### Connection of the Stainless Steel Motors

The stainless steel motors are not provided with the customary terminal devices for the connection. The winding ends are available as loose connection leads in the terminal box. These are to be connected to the cable in crimp technology according to the connection diagram. Detailed instructions can be seen in the following;



Open the cover of the terminal box with suitable tools.  
 Attention: Do not damage thread and O-ring.  
 Have suitable cable glands (matched to the cable diameter and protection class) ready. Plastic glands are not admissible.  
 Attention: The cable and the crimp connectors used for motors type TENV ... **must be suitable for temperatures up to 120°C**.



Prepare the leads the motor winding for the correct connection in Y or  $\Delta$  acc. to the motor nameplate.

Prepare the connection of the protective conductor.



Guide cable through the cable gland into the terminal box. Ensure that the assembly and fastening of gland is carried out carefully in order to maintain the protection class, if necessary use additional compound material for the thread. Should the second cable entry not be used, this must be thoroughly closed with the blind plug out of stainless steel.



Properly remove the insulation from the motor leads and the cable leads and have a shrink hose ready with a corresponding diameter and length.

Provide the protective conductor of the cable with a ring cable lug.



Connect motor leads and cable leads with suitable crimp connectors acc. to the connection diagram. The same applies to the PTC thermistors if necessary.

Connect protective conductor to the earth connection.



Pull the shrink hose over the crimp connection and carefully fix with suitable hot air fan so that the entire connection is well protected against contact and humidity.



Close the terminal box with the cover. Ensure that the O-ring is not damaged and the cover is well tightened without canting.

Upon special request, suitable connection material (crimp connector, shrink hose) can also be supplied.

### Wiring Instructions

In order to avoid electrical interferences of motor protection devices (PTC thermistor TP, winding protection thermostats TB), the following is admissible:

- Separately screened supply conductors can be laid together with clocked power lines in one cable.
- Non-screened supply conductors must not be laid together with clocked power lines in one cable.

Clocked power lines are in particular:

- Output lines of frequency and servo inverters, rectifiers, soft start and braking devices
- Supply conductors to brake resistors and the like

### Motors with Water Cooling

The water connections are to be connected according to the indicator plates on the motor. The cooling water quantity necessary for cooling the motor must definitely be maintained. Trapped air must be avoided and if necessary eliminated because the cooling is affected. Through the electrical controls, ensure that the motor can only be operated with switched on water current and that the cooling jacket is always completely ventilated. The maximum water temperature is 40°C.

#### Attention!

Water-cooled motors must be provided with a monitoring of the cooling water circulation and/or with a monitoring of winding temperature.

### Motors with Anti condensation heater

The ratings of the anti condensation heater are stated on the nameplate or an additional plate. The heating can be effected in two variants depending on the design:

- Via heating elements which are supplied via separate connecting terminals, or
- via the stator winding by applying an alternating voltage on the connection terminals U1-V1

#### Attention!

Through the electrical controls, ensure that motor voltage and heating voltage are not applied simultaneously.

### Motors with Temperature Control

PTC thermistor for protecting the motor winding correspond to DIN EN 60947-8 and DIN VDE V 0898-1-401:2016-03.

#### Attention!

PTC thermistors must only be operated via corresponding tripping units. Connection voltages >2,5V can lead to a destruction of the PTC thermistors and a damaging of the motor winding.

#### Motors with temperature controls (TB, bimetal switches):

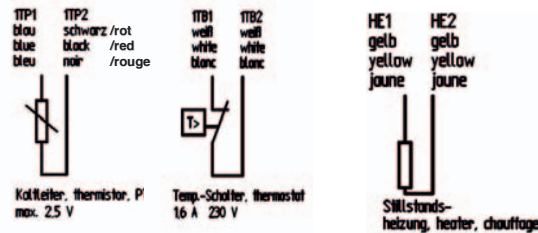
Standard: NC contacts U = 250VAC 50/60Hz I=1,6A

#### Attention!

After the motor has cooled down and the temperature controls have reset, it is possible that an automatic restarting takes place if no countermeasures are taken circuit-wise.

Neusatz!

### Connection examples for PTC thermistors, temperature controls and anti condensation heater



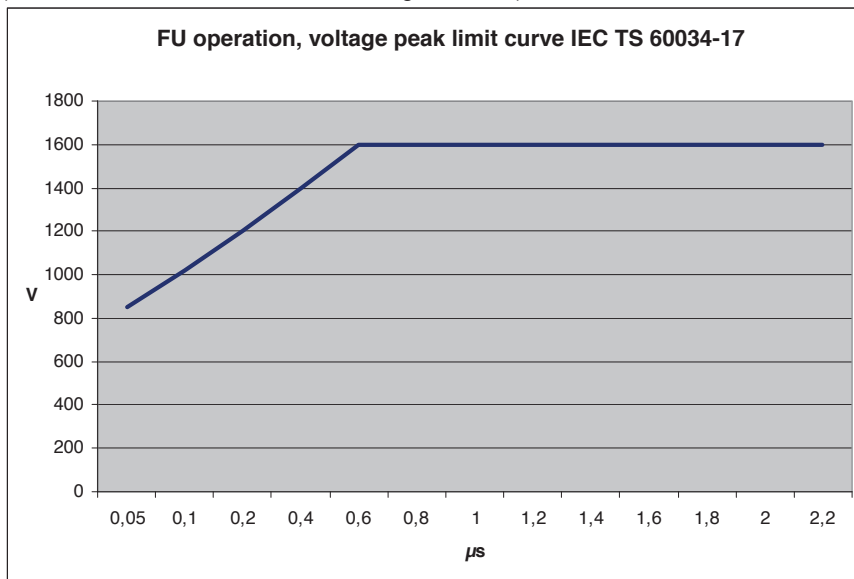
### Motors for Operation with Static Frequency Inverters

For operation with frequency inverters, the motors must be protected with temperature controls through PTC thermistor temperature sensors.

The powers/adjusting ranges admissible for this operating mode are stated on the nameplate or on an additional plate. If not, please definitely contact the manufacturer. During operation on the frequency inverter, test the „electromagnetic compatibility“ acc. to the EMC directive no.2014/30/EU of the drive.

During operation of the motors on the frequency inverters, observe the limits of the admissible voltage loading capacity through voltage peaks for standard windings acc. to the following diagram.

(Limit values of the terminals and winding insulation).



### Special windings

individual agreements between manufacturer and operator apply here

### Commissioning

#### Preliminary work

All corrosion protective agents, dirt or similar agents must be removed from the motor shaft ends (use standard resolvents). The resolvent must not come into contact with bearings or sealing rings as this could result in material damages!

Check whether the motor has become humid through the transport/storage period. In this case, the insulating resistance must be measured (measurement voltage 500 V).

The insulating resistance very much depends on the temperature. This should not be <math><5M\Omega</math> with a normal temperature motor (20-25°C).

If the insulating resistance is not adequate, the motor must be dried.

In order to avoid an escape of the humidity, open the motor, if necessary the stator can be dried more quickly in the drying oven at max.100°C. In order to ensure possible warranty claims, previously contact the manufacturer.

This work must be carried out by qualified personnel. Refer to the corresponding repair instructions for the assembly.

- Check the direction of rotation and the operation during no-load operation. If the direction of rotation should be changed, two power lines must be exchanged against each other.
- If the motor was in storage, it should be run in no-load operation at least 0,5h in order to guarantee a sufficient grease distribution and to avoid an overheating of the bearings.
- Compare the operating current with the current data of the nameplate. The protective devices must be adjusted to the motor ratings corresponding to the nameplate. The stated current value of the nameplate must not be exceeded under permanent load.

#### Attention!

Operate the motor under load at least 1 hour and observe whether unusual noises or a warming occurs.

Vibratory forces  $V_{eff} < 3,5 \text{ mm/s}$  (PN < 15 kW) respectively  $V_{eff} < 4,5 \text{ mm/s}$

(PN > 15 kW) in coupled operation are unobjectionable. With changes in comparison to normal operation – e.g. increased temperatures, noises, vibrations – determine the cause and possibly contact the manufacturer.

#### Attention!

Also do not take the protective devices out of operation during trial operation. In case of doubt, switch the machine off.

## Maintenance

### Inspection

- Continuously monitor the motors independent of the operating conditions.
- Keep the motors clean and the ventilation openings free.

### Lubrication

#### Attention!

In order to avoid damages, bearings and grease must be kept free of dirt. The grooved ball bearings of the stainless steel motors are standardly sealed on both sides and provided with a grease filling by the manufacturer of the bearings. Under normal operating conditions, the grease filling must be adequate for 4 and higher pole motors for 40000 operating hours, with 2-pole motors for 20000 operating hours. Standard grease: Klüberquiet BQH72-102. When exchanging the bearings, it must be ensured that an equivalent anti-friction bearing grease with a dropping point >250°C is used.

### Sealings

The stainless steel motors are equipped with shaft seals and O-rings out of FPM80. The condition of these shaft seals and O-rings must be checked during maintenance and, if necessary, they need to be replaced. On re-assembly ensure that these components are not be damaged.

### Condensate Water

Depending on the environmental and operating conditions, condensate water can form in the entirely closed motors. This is, in low quantities generally not damaging, can however, lead to corrosion damages inside the motor if the condensate is there longer and this should therefore definitely be avoided.

#### Ventilating valve, venting cable glands

in order to prevent condensate from forming with correspondingly critical applications (quick temperature change, cleaning motors at operating temperature, or the like), we recommend the application of special stainless steel cable glands with protection class IP69K with integrated membrane. These special stainless steel cable glands enable an air and temperature compensation from inside to outside (keyword: vent gland) which is neutral with regard to the protection class.

Alternatively, respectively supplementary, the motors can, upon special request, be equipped with screwed-in venting elements (keyword: gore-vent, refer to photo).



Under extreme conditions, e.g. very quick cooling of motors at operating temperature with low ambient temperatures, the effect of the venting elements is limited – dew point.

### Anti condensation heater

In such cases, the application of a space heater can effectively help prevent the formation of condensate. Alternatively to the installed heating element, the heating can also be effected via the motor winding.

### Venting screw/drain plug

Upon special request, Kaiser stainless steel motors are supplied with specially designed venting screws/drain plugs which are installed in the deepest position of the motor with reference to the final installation position.



In easy cases, these can on the one hand help prevent the excessive condensate formation and on the other hand enable the drainage of the developed condensate in which the case the protection class IP66 is possibly maintained. Should, in a particular individual case, the drain plugs be evaluated as inappropriate/inadmissible, the alternative sealing plugs must be regularly opened in order to discharge possible condensate water. The necessary maintenance intervals extremely depend on the environmental conditions, so that no generally valid guidelines can be stated. It is advisable, if there are no empirical values, to carry out a check after the first 80-200 operating hours in order to determine the amount of condensate water.

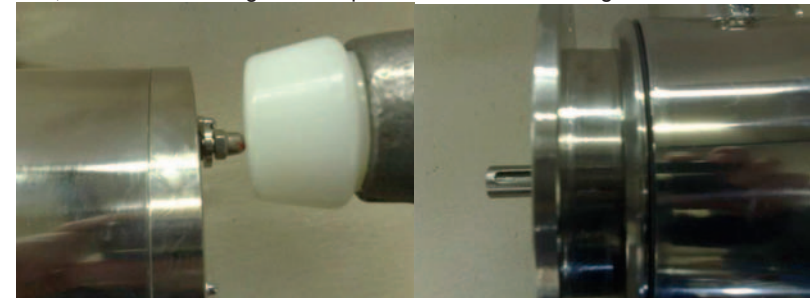
Attention: with corresponding environmental conditions, it must be ensured that the venting holes in the drain plugs remain penetrable and do not clog.

#### Attention:

Motors of the series TENV .., which are prepared for venting screws/drain plugs, do thus not correspond to the protection class IP69K any more.

### Disassembly of the Stainless Steel Motors

In order to disassemble the motors, all 4 tie-bolts on the NDE must be loosened with approx. 5-6 turns. With light knocks with a plastic or rubber hammer on the cap nuts, the DE-shield/flange will be pushed to the front out of the centring of the stator. If the O-ring is free, the DE-shield/flange can be pulled out of the motor together with the shaft.



Attention: By no means should one try to open the motor with a screw driver or the like, in the joint between shield and housing.

**Erklärung der EG-Konformität**  
 Declaration of EC-Conformity  
 Déclaration de conformité CE

**Kaiser-Motoren GmbH**  
**Kieler Strasse 558**  
**D-24536 Neumünster**

erklärt in alleiniger Verantwortung die Konformität der folgenden Produkte  
 declares under sole responsibility the conformity of the following products  
 déclare sous seule responsabilité la conformité des produits suivants

Elektromotoren	electric motors	moteurs électriques
Typ D...	Type D...	Type D...
Typ E...	Type E...	Type E...
Typ T...	Type T...	Type T...
Typ W...	Type W...	Type W...
Typ G...	Type G...	Type G...
Typ A...	Type A...	Type A...

mit Richtlinie  
 with Directive  
 avec Directive

<b>2014/35/EU</b>	<b>2009/125/EC</b>
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Angewandte harmonisierte Normen:  
 Applied harmonized standards:  
 Normes harmonisées appliquées:

**EN 60034**

Produkte, die in den Geltungsbereich der Verordnung Nr. 640/2009 fallen, erfüllen die Anforderungen dieser Richtlinie.  
 Products which are covered by regulation no. 640/2009 do correspond with the demands of this directive.

Neumünster, 26. Januar 2016



Hartmut Schenkewitz





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