

# OPERATING - INSTRUCTION

Three-phase-asynchronous motor  
with  
squirrel-cage rotor

**„Nantong II“**

Type:	HKG 545 G04
Machine no.:	526886 12001
Customer:	Siemens Turbomachinery Equipment GmbH
Customers order no.:	008-322230
Our order / project:	132302 / K.V11-11024

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## 1. Safety instructions

This operating instruction contains important warning instructions and safety instructions. The user has to pay attention to this.

This motor is assigned only for a certain use which is described in the instructions. Besides you find the most important assumptions and safety measures for use and running the machine to guarantee a running without complaining.

We don't take the guarantee and responsibility for use outside the described purpose and without attention to the necessary assumptions and safety measures.

Only specialists are allowed to transport, set up, connect, put into operation, service and operate motors and generators. The specialist has to know the valid safety regulations and erection standards.

All work has to be controlled by responsible specialists.

The specialists have to be authorised for their work.

### Specialists are people who

- are well skilled and have the experience
- know the valid standards, instructions, regulations and accident prevention instructions
- know the functioning and operating conditions of the electrical machines
- know and may avoid dangers

### Non-qualified people and wrong use can lead to dangers for

- body and live
- the machine and further property of the user
- the efficient work of the machine

It's only allowed to operate a machine with the delivered accessories and material from ELIN Motoren GmbH



**The danger warnings characterised in this manual have to be considered especially.**



**Warning of dangerous electrical voltage.**

## Protection equipment



**Insulated tools, isolating protective clothing, protection device, seat belts, devices and other aids must be received in perfect condition. The isolating protective clothing must be examined before each use by the user for obvious damage.**

Damage to isolating protective clothing may be eliminated only by technically suitable workshops. Gloves may not be repaired however. Isolating gloves and shoes must be examined in certain time intervals also electrically for their protective effect.

Carrying of wrist-watches, rings and bracelets with the work is forbidden.

## First aid measures by accidents with electrical current



By accidents with electrical current you should take the following measures:

- ◆ Interruption of circuit by switching off, by pulling the plug, by taking the safety device out.
- ◆ If these measures are not immediately possible, casualty must be pulled away from the electric circuit by using non conductive articles.
- ◆ At high tension and/or unknown tension a distance of min. 5 m has to be held.
- ◆ The helper must stand isolated, for example on a dry board, on dry clothes, on thick newspapers. He may not contact anything else.
- ◆ Call a doctor!
- ◆ **Emergency call:**

Rescue guidance center ..... Phone: .....

- ◆ Accomplish first aid measures up to the arrival of the doctor.
  - immediate placing in rest position
  - control of respiration and pulse
  - when respiratory arrest then breath donation
  - when cycle stop then heart-lung-revival
  - when unconsciousness and existing respiration then side storage
  - germ-free coverage of the fire wounds

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## 2. General description

### Standards and construction specifications

The construction of machines conforms to the regulations according to standards listed on [technical data](#).

Explanation of the abbreviations used in the text:      **DE** ... Drive End  
    **NDE** ... Non Drive End

### Area of application

Only according to specification of your order. See [technical data](#).

#### 2.1. Degree of protection

Generally these motors are designed with degree of protection IP 54, on special order with degree of protection IP55. (see [technical data](#)) This means that the motors are fully protected against touching of components under potential or rotating parts inside the housing.

The motors are also protected against harmful dust deposits at the inside.  
 Splashing of water from all directions against the machine has no harmful effects.  
 Supplementary the degree of protection IP 55 protects against a jet of water which is directed against the motor from any direction.

#### 2.2. Environmental conditions

Unless otherwise is indicated on the rating plate, the rated motor output is valid for continuous operation S1, an ambient air temperature of max. 40 °C and installation up to max. 1000 m above sea level. (see [technical data](#))  
 The normally used bearing grease restricts the lowest ambient temperature to -20 °C.

If the motor will be installed over 1000 m above sea level and/or there is an ambient temperature of more than 40°C, the motor output decreases.  
 (Consultation necessarily)

Generally this motor is designed in climatic stage K2 (see [technical data](#)). The climatic protection stage K2 protects the motor against increased air humidity and chemically aggressive gases and vapours. The climatic protection stage K0 (humid warm climate acc. to DIN50019) and K1 (warm damp climate acc. to DIN50019) are fulfilled.

The motors have to be shielded from radiation heat (e.g. by solar radiation).

We recommend to fix a canopy at motors with type of construction IM V1 resp. V10 (available against extra charge).

In order to ensure an impeccable cooling of the motor, the axial distance between the fan cover and any opposite wall may not fall short to the half diameter of the air intake opening!



**Hot exhaust air may not be sucked in again.**

### 2.3. Stator

The compact and strength then bundle of laminations will be pressed into the stator housing with oversize.

The winding is a two - layer coil type winding with a mica - based insulation of the insulation class F. The insulation with full-length cover of head and slot of the coil is designed with a glow protection.

The individual coils will be secured by means of magnetic slot wedges. Absorbent distance pieces between the coil sides and bindings ensure a high formability of the stator winding. After carrying out of controls and tests, the winding will be pressed into the stator housing. A vacuum - pressure impregnation with epoxy resin makes the winding resistant to any mechanical stresses.

### 2.4. Rotor

The rotor laminations will be shrinked on the smooth solid shaft. Dependent on size and application of the motor, the squirrel - cage will be made so spun - type cast aluminium or copper rods with brazed or induction brazed short - circuit rings made of cooper.

The rotor will be balanced by means of a half key which is inlayed into the shaft extension. On special order the rotor will be balanced with the whole key. (See [technical data](#))

### 2.5. Bearings

The motor will be designed with grease lubricated roller bearings with regreasing device and grease quantity regulator.

Frame – size 355:

Motors for horizontal mounting are equipped with each one groove ball bearing on DE and NDE. The NDE – bearing takes over the function of a stationary bearing and so the shaft extension will work towards DE.

Frame – size 400 and higher:

The Motors are equipped with each one roller bearing on DE and NDE in order to absorb the radial forces. An additional deep-groove ball bearing will usually be installed on DE which takes over the function of a stationary bearing. (see [technical data](#))

Motors for vertical mounting are equipped with at least one angular ball bearing on NDE in order to absorb axial forces (weight of rotor and coupling) as well as a spring - mounted radial deep-groove ball bearing on DE which takes over the function of a moveable bearing. As there the stationary bearing is installed on NDE it has to be taken into consideration that any thermal shaft extension will work towards DE - drive-end.



**Usually the bearings may not be loaded with additional axial and / or radial forces (e.g. in case of belt drive).**

## 2.6. Cooling

The motors of series "HKG" will be designed in cooling method IC 411 (surface-cooling). Cooling medium is the ambient air which will be blown over the ribbed housing by means of a fan on NDE. Usually the fan is located directly of the motor shaft.

The fans for 2 - and 4 - pole motors are usually designed for only one sense of rotation. Exception: 4 – pole motors of frame size 355 are designed with bi – directional fans. (see [technical data](#))

6- and 8 - pole motors are usually designed with bi - directional fans.

Dependent on the operating conditions, the cooling system should be cleaned at regular intervals.

## 2.7. Terminal boxes and electrical connections

The motor is usually equipped with 3 terminals for high voltage in compliance with DIN standards. The terminal plate with fastened terminals separates the connecting area from the motor interior. The terminal boxes will be designed with degree of protection IP 55 acc. to IEC 60034-5 at least.

Motors for horizontal mounting are designed with top mounted main terminal box. The main terminal box is preferably designated for the connection of synthetic cables.

A cable entrance plate equipped with cable glands is used as traction relief for the terminals; see [technical data](#) and/or [outline drawing](#)  
The traction relief of cables bigger than 50 mm diameter must be executed outside the terminal box.

The main terminal box is provided with a pressure-relief device which guarantees maximum safety for the operating personnel and the surrounding area in case of explosion inside the box.

In case that a brought - out neutral point is required, it will be arranged in a second terminal box. (see [technical data](#))

## 2.8. Auxiliary equipment

Auxiliary equipment (e.g. PT100, space heater, etc.) usually will be connected with NS - terminals in a separate auxiliary terminal box. (see [technical data](#) and/or [outline drawing](#))



### 3. Technical Data

Pos	Item	English	Unit	Remark
1	General			
1.1	Type of machine	HKG545G04		
1.2	Project Name	Nantong II		
1.3	Customer Name	Siemens PGW		
1.4	Material number	526886		
1.7	Project Number	K.V11-11024		
1.8	Customer / Order No.	132302		
1.9	Quantity	1		
1.10	Kind of machine	Three phase asynchronous motor with squirrel cage rotor		
1.14	Order processing technician	Martin Damm		
2	Mechanical Design Data			
2.1	Design Standards and Specifications	EN 60034		
2.2	Duty	S1		
2.3	Mounting form	IM 1001 (B3)		
2.4	Direction of rotation	clockwise		facing motor drive end
2.5	Ambient temperature min/max	-10/+40	°C	
2.7	Site elevation	< 1000	m	
2.10	Insulation class	F		
2.11	Temperature rise	B		measured with embedded Pt100
2.15	Degree of protection	IP 55		
2.16	Type of Ex-Protection	none		
2.17	Installation	outdoor		
2.19	Mass of machine	4210	kg	+/- 5%
2.20	Mass of rotor	1230	kg	
2.22	Inertia of machine	32,1	kg m2	
2.34	Corrosion protection class	Climatic protection stage C3		
2.35	Final painting	RAL 5017		
2.36	Coating layer thickness	3 x 80	µm	Surface treatment and corrosion protection acc. DIN EN ISO 12944-5
2.37	Balancing quality	acc. vibration level - balanced with half key acc. DIN ISO 1940		
2.38	Smoothness of running	Grade A acc. EN 60034 - 14		

3	Electrical Design Data			
3.1	Rated Data on mains			
3.1.1	Rated Output	700	kW	
3.1.3	Service factor	SF 1.0		
3.1.6	Connection Stator	Star		
3.1.12	Rated Voltage (UN)	10000	V AC	
3.1.13	Rated voltage - tolerances	+/-5	%	
3.1.14	Rated Frequency	50	Hz	
3.1.15	Rated frequency tolerances	+/- 2	%	
3.1.17	Rated Speed	1494	rpm	
3.1.20	Over speed	1800	rpm	
3.1.21	for the duration of	2	min	
3.1.26	Rated Torque (FLT)	4475	Nm	
3.1.27	Full load current (FLC)	50	A	
3.2	Efficiency at			
3.2.1	4/4 - load	96,2	%	EN60034-2-1 [2007]
3.3	Power factor (cos phi)			
3.3.1	4/4 - load	0,85		
3.4	Starting Data			
3.4.1	Method of starting	direct on line (DOL)		
3.4.2	Minimum voltage for save start up	80 % x UN		
3.4.4	Starting current (IA)	6,9 x FLC		
3.4.6	Starting torque (MA)	0,85 x FLT		
3.4.8	Break down torque (MK)	2,2 x FLT		
3.4.9	Starting frequency	3 x cold / 2 x warm		@ 100% Un
4	Shaft/Coupling/Slipring			
4.1	Shaft			
4.1.2	Shaft end (amount)	1		
4.1.3	Shape of shaft end DE	normal cylindrical with key		The coupling half has to rest at least on the total length of the feather key.
4.1.4	Axis center hight	$\Delta h = 0.25 \text{ mm}$		due to thermal expansion at nominal operation
4.2	Coupling			
4.2.2	Coupling	direct, flexible		
5	Load Data			
5.1	Driven Load	compressor		
5.2	Load moment of inertia (J)	10	kg m2	referred to motor speed
5.3	Load torque curve	Against closed valves. Load torque decreasing by square against speed, beginning at 50% FLT and		

		rated speed, break-away torque = 10% FLT		
5.4	Power consumption	unknown		
6	Cooling			
6.1	Design Data			
6.1.1	Method of cooling	IC411		
7	Bearing Data			
7.2	Anti friction bearing	incl. drayer for used up grease DE/NDE		
7.2.1	Type of bearing	regreasable anti friction bearing		Life time 100 000 hours
7.2.2	Fixed bearing	DE		
7.2.3	Type of lubrication	Grease (Mobilith SHC 100)		
7.2.4	Relubrication quantity	DE 90 g / NDE 45 g		
7.2.5	Depending on the average bearing temperature during operation (DE side), the following lubrication intervals: apply for both bearings (DE + NDE): The bearing temperatures have to be checked continuously and the according lubrication intervals have to be observed.	75°C 5.000 h 80°C 4.000 h 90°C 2.500 h 100°C 1.500 h		
7.2.10	Additional force radial	none		
7.2.11	Additional force axial	none		
9	Terminal boxes			
9.1	Main Terminal box			
9.1.1	Line site terminal box	1, acc. ELIN standard		
9.1.1.2	Degree of Protection	IP 55		
9.1.1.5	Location	right / oblique (near motor DE)		
9.1.1.7	Amount of connections (bus bar)	3	piece	
9.1.1.8	Location cable entry	bottom		
9.1.1.9	Gland plate	with nonmagnetic, removable and undrilled gland plate		
9.1.1.10	Amount of cables			
9.1.1.11	Cable type	unknown		
9.1.1.12	Amount of glands	unknown		
9.1.2	Star Point Terminal box	none		
9.2	Auxiliary Terminal boxes			
9.2.1	Monitoring Terminal box	1, acc. ELIN standard		
9.2.1.2	Degree of protection	IP 55		
9.2.1.5	Location	top		
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9.2.1.16	Contains	RTD and space heater		
10	Control and Monitoring Equipment			
10.1	Stator			
10.1.1	Stator winding temperature			
10.1.1.1	Sensor			
10.1.1.1.1	Type of monitoring	Resistance temperature measurement		
10.1.1.1.3	Type of element	Single PT100		without monitoring equipment
10.1.1.1.4	Number of elements	6	piece	
10.1.1.1.6	Connection from Terminal box	3-wire		
10.1.1.1.8	Shielded	none		
10.3	Bearing			
10.3.2	Bearing metal temperature			
10.3.2.1	Sensor			
10.3.2.1.1	Type of monitoring	Resistance temperature measurement		
10.3.2.1.3	Type of element	Double PT100		without monitoring equipment
10.3.2.1.4	Number of elements	1	piece / bearing	
10.3.2.1.6	Connection from Terminal box	3-wire		
10.3.2.1.7	Shielded	none		
10.4	Space heater			
10.4.1	Type	tubular space heater		
10.4.3	Rated voltage	230	V AC	wired to aux. terminal box
10.4.5	Rated power	300	W	

## 4. Transportation and storage

### 4.1. Transportation



For lifting of the motor with the help of load hooks, only the lugs on housing may be used.

#### 4.1.1. Dimensions and weights

The dimensions and weights can be inferred from the [outline drawing](#).

#### 4.1.2. Rust protection

All bare surfaces which are susceptible to rust will be given a protective coating before being packed.

#### 4.1.3. Transport safeguard

Motors with type of construction IM V1 resp. V10 with angular ball bearings have to be transported in vertical position. If a transport in horizontal position is necessary, the rotor has to be fixed by a special protection device.

Motors with roller bearing(s) are normally equipped with a transport protection device. This device may only be removed before installation of the half - coupling at first. Corresponding instruction plates are placed on the machine.



**Before operation the safeguard device must be loosened! For a new transport the device must be installed again.**

#### 4.1.4. Package disposal

The package must be disposed by the local waste industry law.

## 4.2. Storage

<b>Anti-friction bearing machines</b>					
If you take preservation measures other than those described below, Elin Motoren GmbH shall not be held liable for any resulting damage. All such damage shall be excluded from the manufacturer warranty/liability.					
You must determine in advance for how long the machine is to be stored. Based on the duration of storage, refer to the respective column and implement the recommended measures.					
	Storage for up to 3 months (short-term storage)	Storage for up to 7 years (long-term storage)	Outdoor storage up to one year	Storage on foundation provided on the construction site for up to two years	Storage of standby machines (fully installed and connected)
Store the machines in a well-ventilated, dry, dust-free and heated room (temperature constantly between 15 to 40°C; sudden temperature fluctuations are not permitted)	●	●			●
Vibration-free storage on rubber elements - if necessary, measure total vibration	●	●	●	●	
Air humidity should be 55% (min 40% / max. 70%)	●	●			●
Storage near cold walls (<0.5m), heating pipes (<0.5m) or directly on stone floors is not permitted	●	●			
Storage in atmospheres containing aggressive substances is not permitted.	●	●	●	●	●
If installed, switch on the anti-corrosion heater system	●	●		●	●

Apply anticorrosive agent to shaft ends, support surfaces and all other areas that are not coated and are accessible. Recommended product: Tectyl 506 or equivalent)	●	●	●	●	●
At the beginning and the end of the storage period, carry out insulation resistance measurements. Document winding temperature, ambient temperature and measured values. When positioning the machine for storage, observe the commissioning instructions.	●	●	●	●	
During storage, the I value must be measured every 6 months. Document winding temperature, ambient temperature and measured values.		●		●	●
Fill oil-lubricated bearings with the prescribed volume of oil. For storage periods of more than 6 months, change the oil - observe correct filling volume	● There is no need to change the oil	●		●	
The anticorrosion agent must be re-applied every 6 months		●		●	●
Seal all cable ducts	●	●		●	●
The machine must be completely protected against the elements (direct sunlight, etc.), humidity and dirt/dust.	●	●	●	●	●

Every 6 months, turn the rotor by minimum 5 revolutions, if possible. The position of any mark after rotation must be opposite that before rotation (180° angle). (Remove transport safety devices!) For storage up to 12 months, there is no need to rotate the rotor.		●		●	●
For machines with attached heat exchanger ► see manufacturer documentation in the operating manual	●	●		●	●
For storage periods of more than 2 years, we strongly recommend changing the bearings and the lubricant.		●			
After a storage period of 6 months, the bearings and lubricant shall not be covered by warranty		●	●	●	●
In sea transport packaging only			●		
Pack the machine in sealed aluminium foil and place desiccant (silica gel, 1 kg per 1000 kg of machine weight) in the envelope. Ensure that all air is removed from the foil envelope.			●		
Only in timber boxes, sealed with water-proof glue and equipped with internal support strips			●		
Base construction and inside stops made in solid wood			●		



Secure the machine in the box to the base planks, using square neck carriage bolts or threaded rods (insert rubber elements), the longitudinal and cross supports of the box			●		
Lid reinforced with internal cover and lid support timbers. The lid must be placed on the box during the entire storage period.			●		
Cover the box with a tarpaulin (= additional protection against storm weather, snow, etc.). Secure tarpaulin to the box.			●		
Regularly inspect the packaging and tarpaulin at intervals that are appropriate for the prevailing conditions			●	●	
Never place the box directly on the ground ► place box on stacked timber squares			●		
The room must be well ventilated, dry and free of vibration; if necessary, measure total vibration	●	●		●	●
Protect the machine against dirt, dust, humidity and wetness ► cover the machine with a tarpaulin or suitable foil				●	
Machines of vertical design must be stored vertically	●	●	●	●	●
Every 6 months, switch on the machine for a short period of time (≥ 5 minutes)					●

**There is no guarantee for bearing and grease after a longer stop time!**

## 5. Assembling und operation

### 5.1. Installation and alignment

See [assembly Instructions](#) in the appendix.

### 5.2. Power transmission

Generally, the motors of this series are only suited for being driven via a direct, flexible coupling (see [Bearings](#)).

The coupling half to be mounted on the shaft end must – like the motor – be dynamically balanced with a half feather key. However, in exceptions – if the motor is balanced with a full feather key – the coupling must be balanced **w i t h o u t** feather key!

Before mounting the coupling, be sure to remove the rust-protection agent from the shaft stub, using gasoline or kerosene. The shaft stub manufactured as having an m6 ISO fit requires an H7 tolerance so as to ensure a satisfactory fit of the linking elements in the bore. The shaft end is to be greased with a special lubricant, e.g. Molykote G-n, then insert the feather key and mount the coupling. The shaft end includes a threaded bore permitting the mounting procedure by means of the usual mounting tool. For a somewhat tighter fit, which may result from machining tolerances, heating the parts to be mounted evenly to about 60°C will be advantageous.

The motor and the driven machine must be oriented such that their shaft ends are as exactly in alignment with one another as possible. This helps you avoid premature wear of coupling and bearings and ensures the required balance quality.

When selecting the appropriate spacing of the two coupling halves, the thermally induced shaft expansion must be taken into account.

#### **Guidelines for max. radial eccentricity:**

- max. 0.03 mm      with a high rpm count (about 3600 rpm) and a not very flexible coupling.
- max. 0.10 mm      with a low rpm count (about 500 rpm) and a highly flexible coupling.

Please make sure that no axial forces are imparted on the guide bearing via the coupling (e.g. due to axial distortion during operation).

Rotating, freely accessible parts must be covered with a touch guard!

If, in a motor having 2 free shaft ends, a coupling half is mounted only on one shaft end, the feather key of the second shaft end must be removed, as it is only secured against falling out during shipping!

In the event of high demands in terms of balance quality, rebalancing of the machine may be necessary.



**If a second shaft end remains vacant, it must be provided with a touch guard. You are obligated to provide for such guard! Otherwise, the accident hazard will be great.**

## 5.3. Power supply

### 5.3.1. General information

Before connecting the motor to the network, the relevant safety instructions resp. the appropriate national regulations have to be observed. Power requirement, mains voltage and frequency have to correspond with the indicated data on the name plate of the motor. The circuit diagram inside the terminal box (cover) shows the obligatory connection on the terminal plate. (see [connection diagram](#))



**The motor housing has to be grounded in compliance with the relevant safety instructions. Terminals for the connection of protective conductors are available at the inside of the terminal box and on the motor housing.**

Earthing conductors should have a cross-section as follows:

- min. 70 mm<sup>2</sup> till 200 MVA (6 und 10 kV)
- min. 185 mm<sup>2</sup> at 6 kV (resp. 150 mm<sup>2</sup> at 10 kV) for a short circuit output up to 500 MVA

### 5.3.2. Rated voltage, Rated output, Frequency

The rated voltage of a three phase network is designated as the potential between 2 outer conductors.

The permissible voltage deviation during operation is +/- 5 % at rated output and frequency.

In this case the permissible excess temperature in the stator winding can be exceeded by up to 10 K at outputs up to 1000 kW and by up to 5 K at outputs > 1000 kW in compliance with ÖVE-M10 resp. VDE 0530.

If the mains voltage falls short of the rated motor voltage by more than 5 % (however max. 10 %) at rated frequency, the motor output has to be reduced by approximately the same percentage.

### 5.3.3. Direction of rotation

If the mains cable L1 will be connected to terminal U, L2 to >V and L3 to W, the sense of rotation of the motor is clockwise (at a view of DE). This is also valid for motors which are not suitable for clockwise rotation!

The direction of rotation can be altered by the exchange of two outer mains cables.

If the motor is only suitable for one sense of rotation, the direction will be indicated by an arrow on the name plate. An indication of the sequence in which the terminals have to be connected to the individual phases (L1, L2, L3) will also be shown on the name plate.

Motors which are marked in such a manner may only run in the appropriate direction of rotation (at a view of DE). See also [technical data](#) and [outline drawing](#).

#### 5.3.4. Terminal box, Line connection

Remove the transport cover of the compression gland, if necessary, adapt the cable diameter to the diameter of the rubber seal and the cord grip (e.g. by winding a sealing strip around it). In extreme cases, it may be necessary to exchange the parts of the cable entry gland (see [Terminal Boxes and Electrical Connections](#)).

When using cable glands greater than M48, the strain relief must be provided for outside the terminal box!

The connecting leads must be placed in the terminal box in an exposed configuration and without strain relief. The cable lugs must be selected depending on the conductor cross-section and the bolt diameter. Contact nuts and lock nuts shall be tightened to the specified max. torques only. It is absolutely necessary to comply with the minimum clearances (> 36 mm for 3 kV, > 60 mm for 6 kV, and > 100 mm for 10 kV) of between energized and bare parts and toward metal parts. Watch out for protruding wires.

When connecting aluminum cables, make sure to remove the oxide layer from the conductor, in its portion to be clamped down, by brushing it off and protect it immediately against renewed oxidation by means of contact grease.

Since aluminum may yield under contact pressure, be sure to retighten the contact screws after about 24 hours and once again after about 4 weeks. When using aluminum cables, appropriate cable lugs must be used (stress corrosion).

Take appropriate measures to keep water and dust from penetrating into the interior of the terminal box along the connecting cables.

Cable entry openings that are not being used must be closed or sealed off, and the terminal box cover must be applied and screwed down properly.

Pg glands are used as cable entry glands on auxiliary terminal boxes. The terminal blocks with screw-type terminals do not require any special preparation of the conductor. However, should wire end ferrules be used, they must be crimped on the conductor by means of appropriate crimping pliers. The nominal conductor cross-section for terminals is 2.5 mm<sup>2</sup>.

The minimum clearance for 380 V is 6 mm.



**For the connection between the power cables and the copper terminals the valid standards for material and type of connection must be fulfilled. The tightening torques which are stated on the dimensional drawing of the terminal box are only valid for the connection between the insulators and the copper bars.**

## 5.4. Auxiliary equipment

### 5.4.1. Temperature monitoring of stator winding

Generally, temperature monitoring of the stator winding on our motors of this series is carried out with the help of 1 PT100 resistance thermometer (platinum series, 100  $\Omega$  at 0 °C) each per phase, which is installed between top and bottom layer of the winding in the slot portion (see [technical data](#)). A resistance of 100  $\Omega$  corresponds to a winding temperature of about 0 °C and a resistance of 157.24  $\Omega$  to a temperature of about 150 °C. Any values in between can be determined by interpolation (see pertinent [Table](#) in the Appendix).

The suitable evaluation device for continuous temperature monitoring is not a part of our scope of delivery, however, we are able to provide it for an extra charge.

The conductor ends of the resistance thermometers are brought out to terminals accommodated in a separate auxiliary terminal box (see [Dimensional Drawing of Motor](#)).

Between these terminals and the evaluating device a three-conductor circuit (also a four-conductor circuit on request) can be deployed for compensation purposes (terminals are available). See [Connection diagram of Pt 100 Slot Thermometers](#).

On request, our motors can also be fitted with 2 PT100 resistance thermometers per phase and additional surge diverters.

As regards the settings for "warning" and "shutdown" see [technical data](#).

As can be seen, these settings are to be considered as maximum values. To detect any occurring over temperature in the winding as early as possible, we recommend to determine the highest winding temperature at max. room temperature; then, "warning" should be set to a value 5 -10 °C higher than such temperature and "shutdown" to a value 10 -15 °C higher.



**To avoid any hazards and damage the installation must be switched for temperature monitoring such that after the monitoring responds, any uncontrolled or unexpected restarting of the engine will not be possible.**

### 5.4.2. Temperature Monitoring of Bearings

Each bearing can be fitted - if so requested - with a PT100 resistance thermometer in order to monitor its operating temperature (see [technical data](#)).

The thermometers are arranged close to the bearings. The ends of their measuring winding are brought out to connecting terminals that are (usually) disposed in the same auxiliary terminal box as the resistance thermometers for the stator winding (also see [Temperature Monitoring of Stator Winding](#)).

The respective evaluation device is not included in our scope of delivery.

As regards the settings for "warning" and "shutdown", see [technical data](#) and [Table / Guideline Values for Temperature Settings](#).

As can be seen, these settings are to be considered as maximum values. To detect any occurring over temperature in a bearing as early as possible, we recommend to determine the highest bearing temperature at max. room temperature; then, "warning" should be set to a value 5 °C higher than such temperature and "shutdown" to a value 10 °C higher.



**To avoid any hazards and damage the installation must be switched for temperature monitoring such that after the monitoring responds, any uncontrolled or unexpected restarting of the engine will not be possible.**

### 5.4.3. Bearing Monitoring by means of Shock Pulse Method (SPM Method)

In the motors of this series, the two bearing positions come with standard threaded M8 bores (with 90° taper) for the attachment of the SPM measuring nipples or shock pulse pickups. For their mechanical protection, they are sealed off with screws. Thus, retrofitting of SPM accessories is possible.

For the machine's hardware options, see [technical data](#).

### 5.4.4. Space Heater

If so requested, the motors can be fitted with a space heater (see [technical data](#)).

A space heater prevents, with the motor at standstill, the formation of dew or condensation in the interior of the machine.

Only at the customer's special request will the terminal blocks will be brought out to a separate auxiliary terminal box (see [Dimensional Drawing of Motor](#)).



**With the help of an appropriate interlocking circuit, it must be guaranteed that the space heater will be off while the motor is running and on only when the motor is at standstill.**

## 5.5. Startup

### 5.5.1. Checking of insulation resistance

The machine is equipped with windings being unsensitive against humidity. Nevertheless humidity will condense under unfavourable climatic conditions on the surface of the windings, the parts surrounding the windings, and on the supportings and connections to the terminals.

By this fact, it is important to measure the insulation resistance towards earth before first start up and after extended outage. If the winding is connected in star or in delta it is sufficient to determine the insulation resistance of one phase towards earth. The insulation resistance depends on the temperature of the winding. For justification of the insulation condition it is essential to measure the insulation resistance  $R$  (in MOhm) during 1 minute by means of DC-voltage.

A measuring voltage of 1000 V is preferable. In doing so the temperature of the winding has to be approximately determined.

In order to obtain an evaluation hardly depending on the size of the machine the capacity  $C$  ( $\mu\text{F}$ ) towards earth has to be determined, too, or taken from the test certificate.

The measurement of the capacity may be done by means of a capacitance measuring bridge or can be taken from a measurement of current voltage using 220 V AC.

The product of insulation resistance and capacity is to be listed in the enclosed diagram over the determined winding temperature.

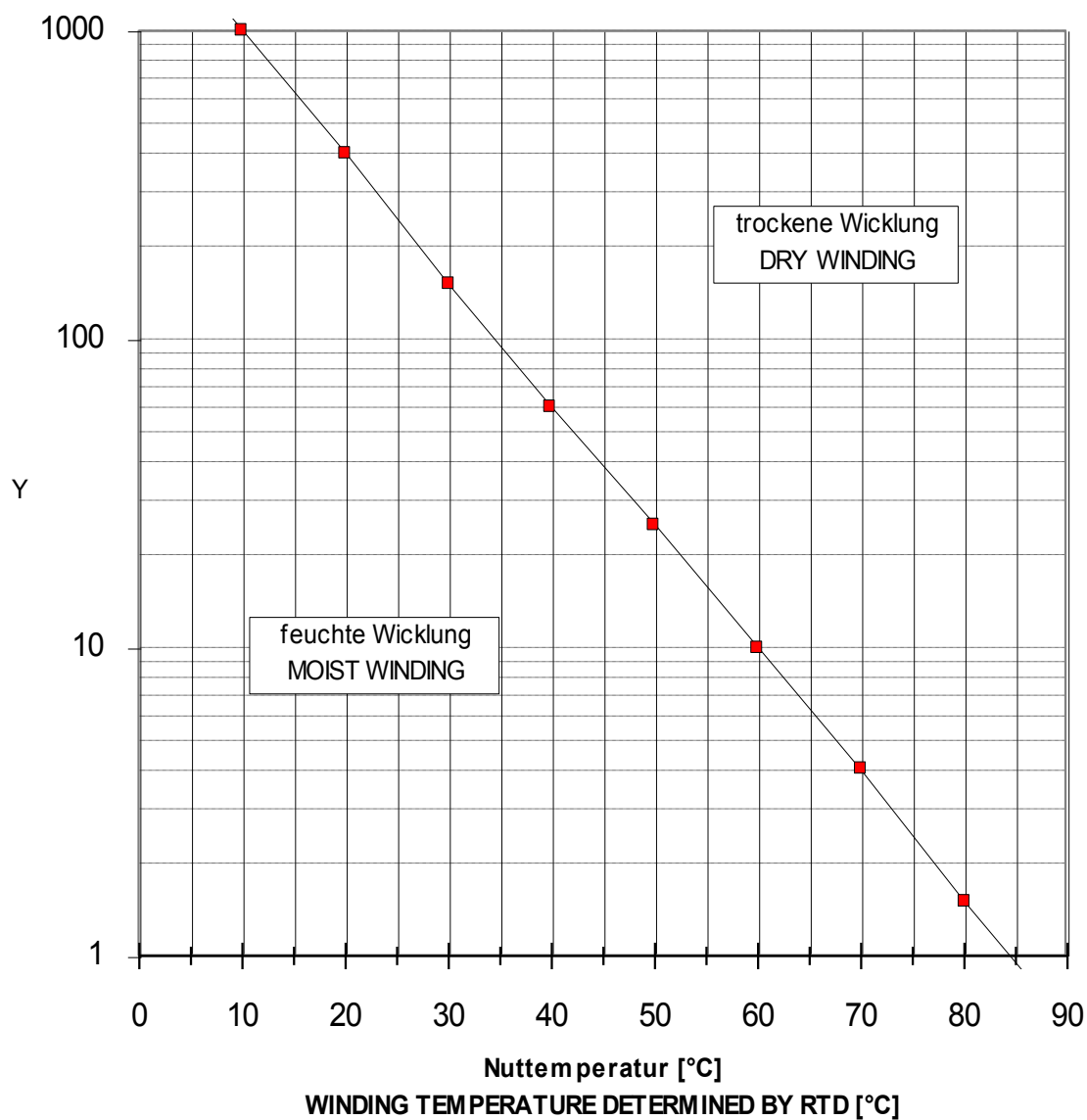
Depending on the location of the point within the ranges "DRY WINDING" or "MOIST WINDING" the machine is ready for starting-up or has to be dried out by proper means until the condition for starting-up is achieved.

The drying out should be done with warm air taking care of the possibility of air exchange. Any method of drying that involves heating the winding must be checked and controlled so that the winding temperature in the stator and rotor does not exceed 60 °C.

The manufacturer is always at your disposal if you need additional information in special cases.

Diagram see next page!

## INSULATION TIME CONSTANT



Y => Isolationszeitkonstante T / INSULATION TIME CONSTANT T

$$T = R \text{ [M}\Omega\text{]} \times C \text{ [}\mu\text{F]}$$



### 5.5.2. General Information

Only qualified technicians familiar with the applicable safety provisions may connect the motor to the mains.



**Prior to starting the motor, it is absolutely necessary that the pertinent rules for installation and setup and the instructions contained herein be observed. Winding and bearing temperatures must always be monitored during startup.**

The following checks should be carried out:

### 5.5.3. Checklist for First startup

Before commissioning the [commisioning-clause](#) has to be taken into account!

**The machine is surely installed:**

Screw firmly attraction?

☐

**After longer storage or stop:**

Insulation resistances of the windings of ok?

☐

**Examine the electrical connections:**

The specs on the rating plate and the mains specs are identical.

Correct connection?

Check nominal current of motor protecting switch.

Perfect condition of the terminals?

Terminal distances ok?

Mechanical firmness given?

Electrical conductivity?

☐  
☐  
☐  
☐  
☐  
☐  
☐

**Protection device:**

Everything ok?

None manipulates?

Function control?

☐  
☐  
☐

**Transport safeguard devices:**

Are all from the motor shaft removed?

☐

**Examine the free movement:**

Correct adjustment?

Is moveable easily with the hand?

☐  
☐

**Lock the covers and cover plates:**

Are all again properly locked?

☐

**Examine the direction of rotation:**

The machine turns into the correct direction?

☐

**Abnormal behavior:**

Vibrations?

Noise?

Temperatures?

☐  
☐  
☐

**Cooling:**

Sufficient cooling ensures?

Air intake openings and ribbed ducts are not obstructed.

Ambient temperature ok?

☐  
☐  
☐

**Bearing**

Lubrication ok?

☐

**Machine is ready for use!**

☐

The first start up was accomplished by:

[Confirmation to manufacturer](#)

Name: .....

Date: .....

Company: .....

Signature: .....

.....

.....

## 6. Service, Maintenance

### 6.1. General



**Before starting any work on the machine, make sure to ascertain that it has been shut down and protected against any restart!**

The type of operations management and the circumspection exercised in maintenance are of a general significance for the useful life of the machine.

One of the most important factors is to keep all cooling air pathways clean. Therefore, it is necessary to clean the machine at regular intervals to be determined at the plant and to be adapted to the ambient conditions.

In addition, the machine must be inspected at regular intervals for its balance quality, any abnormal operating noise, and other alterations, and their causes must be found and remedied. The frequency of such checks shall be adapted to the operating conditions. In normal operating conditions, we recommend to carry out a machine revision after no more than two years in operation.

Before starting maintenance jobs on the motor, especially before opening the terminal box, the motor or the system must be disconnected from the mains supply and protected against unauthorized restarts. The same applies to all auxiliary power circuits, especially to the space heater.

The frequency of maintenance largely depends on the operating state and the operating mode and on the drive.



**The qualified operating staff determines the time schedule and scope for maintenance work.**

### 6.2. Cleaning the Cooling System

Dirty ribbed ducts at the housing surface impair the dissipation of heat. Therefore, the housing, end shields, fans, and intake openings of the fan shroud must be cleaned with the appropriate frequency.

### 6.3. Lubricating the Bearings

Normally, our motors come fitted with grease-lubricated rolling-contact bearings including a regreasing device and a grease slinger (see [technical data](#)).

Any relubricating should be carried out during ongoing operation.

An information plate on the motor indicates the grease quality and the relubricating schedule and quantity (see [technical data](#)).

The specified values must be strictly complied with in order to ensure long bearing life. Mixing of types of grease with different thickeners and base oils may adversely affect the grease quality, which is why we recommend that you refrain from such practice!



**For aggravated operating conditions (e.g. with large amounts of dirt, additional loads, etc.), the relubricating intervals must be shortened as appropriate.**

After lubricating, the bearing temperature may first rise by a few degrees but will, after the excess grease has been pushed out, drop back to its normal level. In the course of the biennial revision, the used grease must be removed from the used-grease chamber of the outer bearing cover (open cover screw or removal slider, remove used grease). In the event of a design height of 355, the cover screw is not available, and the motor must be disassembled for used-grease removal (see [Sectional Drawing](#)).

#### 6.4. Terminals, Terminal Boxes

Check terminal boxes for leaks and the condition of the connections at regular intervals. Should dust or moisture have collected in the terminal box, clean and dry connecting terminals and the terminal plate with great thoroughness. Remedy the cause of such leak. If necessary, slightly grease metal sealing faces.

#### 7. Dismantling of the motor

Dismantling of the motor is usually not required for normal maintenance work. The motor has only to be dismantled in case that the bearings have to be changed. The enclosed sectional drawing in this manual should usually be sufficient for the expert to understand the basic motor design and to replace the bearings. The actual motor design might be different to the enclosed sectional drawing in some details. It is advisable to replace also the V-rings together with the bearings. Normally V-rings of shape S (with beveled backside) will be used. The butting face for the V-ring lip has to be greased slightly.

For installation and service works you have the possibility to keep the services of ELIN Motoren GmbH busy.



**We can not take on the liability resp. responsibility for independent works on motor which not be carried out by experts of our company.**

## 8. Warranty / Failure

In case of any warranty claims, the "General Terms of Delivery of the Austrian Electric and Electronic Industry" shall apply for goods supplied within Austria.

For supplies to foreign countries, our "General Terms of Delivery" shall apply. They are essentially based on the recommendations of the "United Nations Economic Commission for Europe".



**We want to emphasize that we will not assume any liability in case of non-observance of this Installation, Operating and Maintenance Instruction.**

**We also can not take on the liability resp. guarantee for damages on the motor which has been caused by independent works resp. not under the supervision of experts of our company.**

Not to loose the right to guarantee, please inform in any way our department „Services“

### **ELIN Motoren GmbH**

#### **Dept. Services**

Elin-Motoren-Straße 1  
8160 Preding/Weiz  
Austria

Phone: (+43/3172) 90 606 – 2463-0

Fax: (+43/3172) 90 606 1504

E-mail : [contact@elinmotoren.at](mailto:contact@elinmotoren.at)

### 8.1. Failure



**If there occurs any failures you must switch off the machine** and please contact our service-department (address see above). In the [appendix](#) you have some failure reports which you can send us by fax. So we can treat your failure diagnosis faster.

[Electronic failure report](#)

#### **Commissioning-clause:**

The contractor shall commission the unit according to the protocol no. QC2-EMG56-004e in order to prevent potential assembly flaws and gain reference values for subsequent on-site measurements. Please take the protocol from [assembly Instructions](#) in the appendix of the operating instructions or request it at [contact@elinmotoren.at](mailto:contact@elinmotoren.at).

In cases where the unit is commissioned by the contractor or one of his subcontractors, the procedure must be completed as laid down in the protocol. The contractor shall be liable for any defects resulting from non-compliance with the instructions in the protocol, and it is the duty of the contractor to provide evidence for his compliance with these instructions.

## 9. Emergency data

### 9.1. Fire fighting



- 1) Switch off the machine immediately
- 2) Secure against restarting
- 3) Contact the fire department and refer to electrical fire
- 4) Fight fire with suitable extinction agent (e.g. CO<sub>2</sub> - Fire extinguisher)



## 9.2. First aid measures by accidents with electrical current



By accidents with electrical current you should take the following measures:

- ◆ Interruption of circuit by switching off, by pulling the plug, by taking the safety device out.
- ◆ If these measures are not immediately possible, casualty must be pulled away from the electric circuit by using non conductive articles.
- ◆ At high tension and/or unknown tension a distance of min. 5 m has to be holded.
- ◆ The helper must stand isolated, for example on a dry board, on dry clothes, on thick newspapers. He may not contact anything else.
- ◆ Call a doctor!
- ◆ **Emergency call:**  
 Rescue guidance center ..... Phone: .....
- ◆ Accomplish first aid measures up to the arrival of the doctor.
  - immediate placing in rest position
  - control of respiration and pulse
  - when respiratory arrest then breath donation
  - when cycle stop then heart-lung-revival
  - when unconsciousness and existing respiration then side storage
  - germ-free coverage of the fire wounds

## 10. Spare Parts

### 10.1. Spare parts inventory

A list of the parts subjected to wear is attached to the specification. This list shows those parts which are usually required. There is a precise distinction between parts subjected to normal wear and tear, which can therefore be regarded as "required" spare parts, and parts that might become faulty and are therefore merely "recommended" spare parts.

### 10.2. Order procedure

#### Ordering address:

**ELIN Motoren GmbH**  
**Dept. Services**  
 Elin-Motoren-Straße 1  
 8160 Preding/Weiz  
 Austria

Phone: (+43/3172) 90 606 – 2463-0

Fax: (+43/3172) 90 606 1504

E-mail : [contact@elinmotoren.at](mailto:contact@elinmotoren.at)

Necessary data for a perfect order processing:

#### Machine data:

Type: HKG 545 G04  
 Serial no.: 526886 12001

#### Data of spare parts: (e.g.: Bearing DE)

Stock no. : 5981348  
 Spare part : grooved ball bearing  
 Quantity : 1 piece



# Spare part list

Spare part which are recommended by manufacturer:

- Spare parts inventory necessary
- ✱ Spare parts inventory recommended

Spare part		pcs	Type	Stock-no.
Bearing DE	○	1	Grooved ball bearing	5981348
Bearing DE	○	1	Cylinder roller bearing	978073
Bearing NDE	○	1	Cylinder roller bearing	978073
Sealing ring DE & NDE	○	2	V-RING	909571
Bearing thermometer	✱	2	PT100	23042
Space heater	✱	2	Tube heater	5896437A
Grease	○		Mobilith SHC 100	11665

## 11. List of revisions

Date of issue	Issue	Modified page	Kind of modification
07.03.2012	01	---	First Edition / gh-hg

## 12. Use confirmation

I confirm that I read the operating manual attentively and I will keep the aforementioned regulations and references.

The operating manual read by:

..... Signature	..... Date
..... Signature	..... Date
..... Signature	..... Date
..... Signature	..... Date
..... Signature	..... Date

### **ELIN Motoren GmbH**

Elin-Motoren-Straße 1  
8160 Preding/Weiz  
Austria

Phone: (+43/3172) 90 606 – 0  
Fax: (+43/3172) 90 606 – 1504  
E-mail: [contactemg@elinmotoren.at](mailto:contactemg@elinmotoren.at)  
Internet: [www.elinmotoren.at](http://www.elinmotoren.at)

## 13. **Appendix**

### 13.1. **Drawings**

<a href="#">Outline drawing machine</a>	Dg.no. 5900396	1 page
<a href="#">Sectional drawing</a>	Dg no. 5897564	1 page
<a href="#">Stator terminal box</a>	Dg no. 5899205	1 page
<a href="#">Connection diagram stator</a>	Dg.no. 5203046	1 page
<a href="#">Connection diagram PT100 and Space heater</a>	Dg.no. 5898616	1 page
<a href="#">Rating plate</a>	Dg.no. L526886	1 page

### 13.2. **Descriptions**

<a href="#">Assembly Instructions</a>	17 pages
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### 13.3. **Declaration of conformity/of Incorporation**

<a href="#">Form</a>	2 pages
----------------------	---------

### 13.4. **Tables**

<a href="#">PT - Calibration</a>	without Dg.no.	1 page
<a href="#">Guide values for adjustment of tripping temperatures</a>	without Dg.no.	2 pages

### 13.5. **Failure report**

<a href="#">Form</a>	QC4-EMG02-002E	1 page
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BS / NDE

Lage der Klemmenkästen  
nach Maßbild  
POSITION OF TERMINAL BOX  
ACCORDING OUTLINE DRAWING

Stillstandsheizung  
SPACE HEATER

Stillstandsheizung  
SPACE HEATER

Transportsicherung  
TRANSPORT PRECAUTION

Kondenswasserablauf  
CONDENSATE DRAIN

Schutzleiteranschluss  
EARTHING TERMINAL

Kondenswasserablauf  
CONDENSATE DRAIN

AS/DE ..... Antriebsseite / DRIVE END  
BS/NDE ..... Nichtantriebsseite / NON-DRIVE END

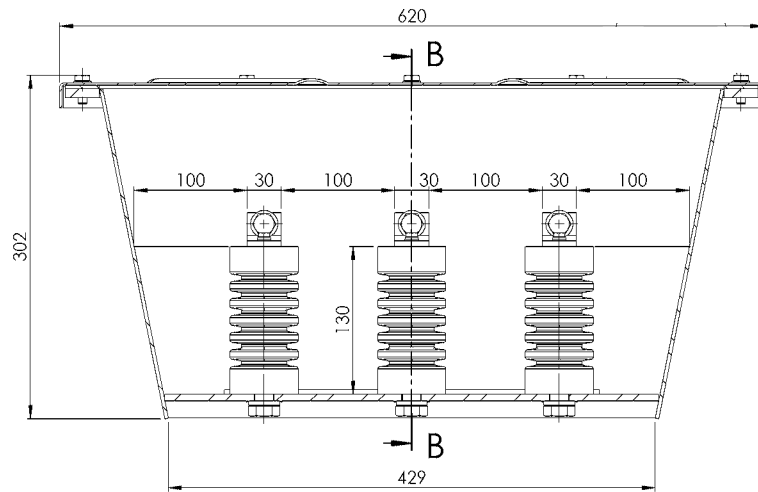
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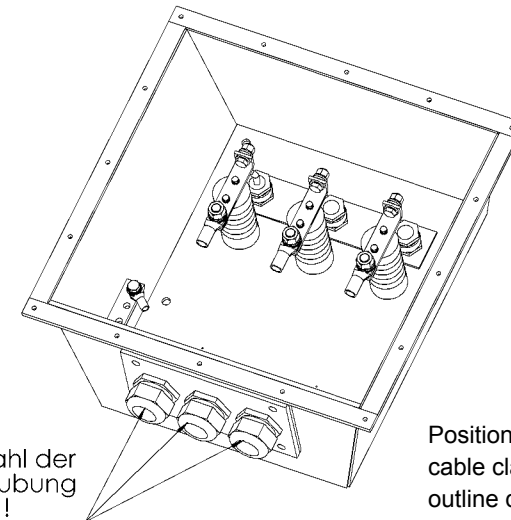
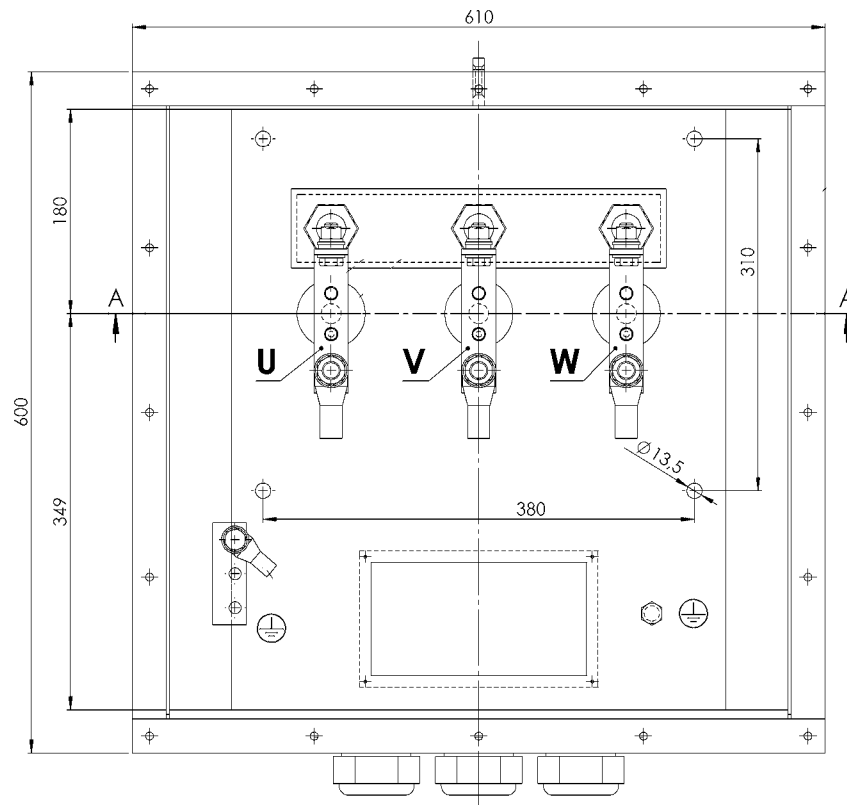
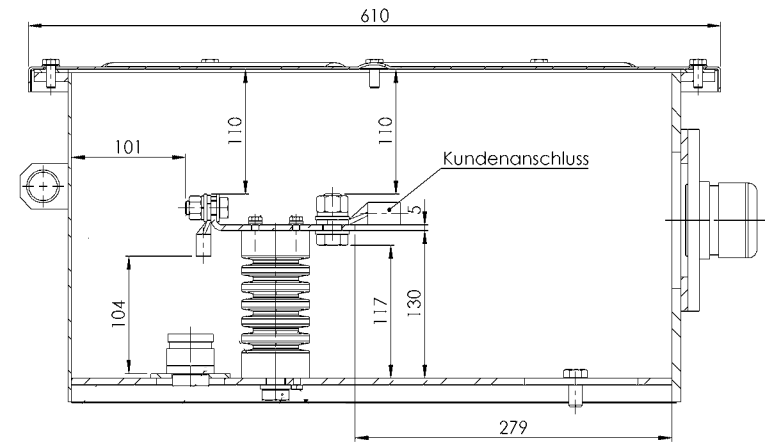
[illegible]

Getr./Stückliste PARIS L1: SERIE		A: <input type="text"/>	B: <input type="text"/>	C: <input type="text"/>
Modul SCALE	Anlage / PLANT Kunde / PURCH.	Projekt Nr. Klassen Nr.		Oberfläch SURFACE
1:3.5	Type HKG-S45-04-08			Allgemeintoleranzen GENERAL TOL. ISO 2768- (DIN 9138-1)
	Bearb./DES 29.03.01 Klömminger			
	Gegr./DMEK			
Schnittzeichnung SECTIONAL DRAWING		5897564		Bl. /Sheet von /OF
		Ähn. /MOD		
		Ähn. Z. /SIM. TO		
		Ers.f. /SUBST FOR		
		Ers.d. /REPL BY		
Mod Nr. 5897564.schn	Mappen Nr. HK0545.Schnitt			
				m A2

# **SNITT-DARSTELLUNG A-A**



# **SNITT-DARSTELLUNG B-B**



Lage und Anzahl der Kabelverschraubung siehe Massbild !

Position and number of cable clands see outline drawing

TIGHTENING TORQUE Anzugsmoment DIN 43673		
M6	M12	M16
4,5 Nm	40 Nm	80 Nm

Gehr. Stückliste PARTS LIST SEPERATE		Y N	Masse: 42 kg	Massenträgheit: - kgm²
Maßstab SCALE		Anlage / Plant : Kunde / PURCH.	Mat.Nr. -	Oberfläche SURFACE
1:3.33		Type HKG	Projekt Nr. -	acc. DIN ISO 1302
Bearb./DES 25.08.06		Gruber	Klassen Nr. - BG	Allgemeintoleranzen GENERAL TOL.
Gehr./CHECK 27.10.06		Freiðmuth		ISO 2768 - mH OENORM M 1365 - m
Klemmenkasten HKG bis 12 kV komplett			5899205	BL/SHT 1 varn/OF 1
EDV Nr. 5899205_klemmenkasten_HKG			Änd. / REV. 1 1 1 1 1 1 1 1 1 1	Ähn./SIM. TO -
Mappe Nr. -			Ers./ / UBST.FOR	Ähn./SIM. TO -
			Ers.d. / REPLBY	Ähn./SIM. TO -

1	Anzugsmomente hinzugefügt	20.08.2007	GRUBA	X
1	Befestigungselemente ergänzt	05.10.2006	HARBEL	X
Ä	Änderung	Datum	Name	App.

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A4



# Assembly

# Instructions

## Synchronous Generators and Asynchronous Motors with Steel Foundation

Issue no: 02  
Date: 16.02.2010

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**We Keep the  
World in Motion.**

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[www.elinmotoren.at](http://www.elinmotoren.at)

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## 2 **Safety Instructions**

These operating instructions contain important warning and safety instructions. The user is obligated to pay attention to them. In addition to the instructions in this document, the instructions in the operating manual of the motor/generator must be adhered to.

This motor/generator is assigned only to a certain purpose described in the instructions. Besides, you find the most important assumptions and safety measures for using and operating the machine so as to guarantee an operation without complaints. We do not assume any guarantee and responsibility for use beyond the described purpose and in the event that the required assumptions and safety measures have not been observed.

Motors and generators may be transported, installed, connected, started up, serviced, and operated only by specialists who are familiar with the safety provisions and installation rules in effect from time to time. Any and all work must be checked by competent specialists.



Such specialists must have been authorized for the required activities by the person in charge of safety-related legal matters.

### **Specialists are people who:**

- are well skilled and are experienced in the installation of electrical machinery
- know the valid standards, instructions, regulations and accident prevention instructions
- know the functioning and operating conditions of the electrical machines
- know and are able to avoid hazards
- are familiar with dial gauges and aligning equipment

### **Non-qualified people and improper use can lead to serious injury or even death, damage to material and destruction of the machine!**

A motor/generator may only be operated in combination with the delivered accessories and materials from ELIN EBG Motoren GmbH.


<b>DANGER</b>	<b>Risk of injury and damage from powered or rotating parts!</b>
	Before carrying out any work on electrically powered or rotating parts, shut down the motor/generator and secure it against inadvertent switching on!
<b>WARNING</b>	<b>Risks of damage from non-compliance with instructions!</b>
	Before carryout out any work on or with the motor/generator, read the applicable regulations and instructions and observe the instructions in the operating manuals of all equipment to be used for the task.

### 3 Safety Equipment



Insulated tools, protective insulation clothing, protection devices, seat belts, devices and other aids must be received in perfect condition. Users must check protective insulation clothing for obvious damage whenever they intend to use it..

Damage to protective insulation clothing may be remedied and repaired only by technically suitable workshops. Gloves, however, must not be repaired. Insulating gloves and shoes must also be examined at certain intervals as to their protective effect against electricity. Wearing of wristwatches, rings and bracelets at the workplace is forbidden.

<b>CAUTION</b>	<b>Risk of injury and damage due to insufficient or inappropriate safety equipment!</b>
	When carrying out work on or with the motor/generator, always adhere to the relevant safety instructions and use the prescribed personal safety equipment (safety footwear, hard hat, protective gloves).


### 4 Installation and alignment


#### 4.1 General


Remove the anti-corrosive agent from the blank parts. Remove the transport securing devices. The motor/generator has been dynamically balanced prior to delivery.

**All securing pads must be firmly placed on the ground to prevent stress in the generator housing.**

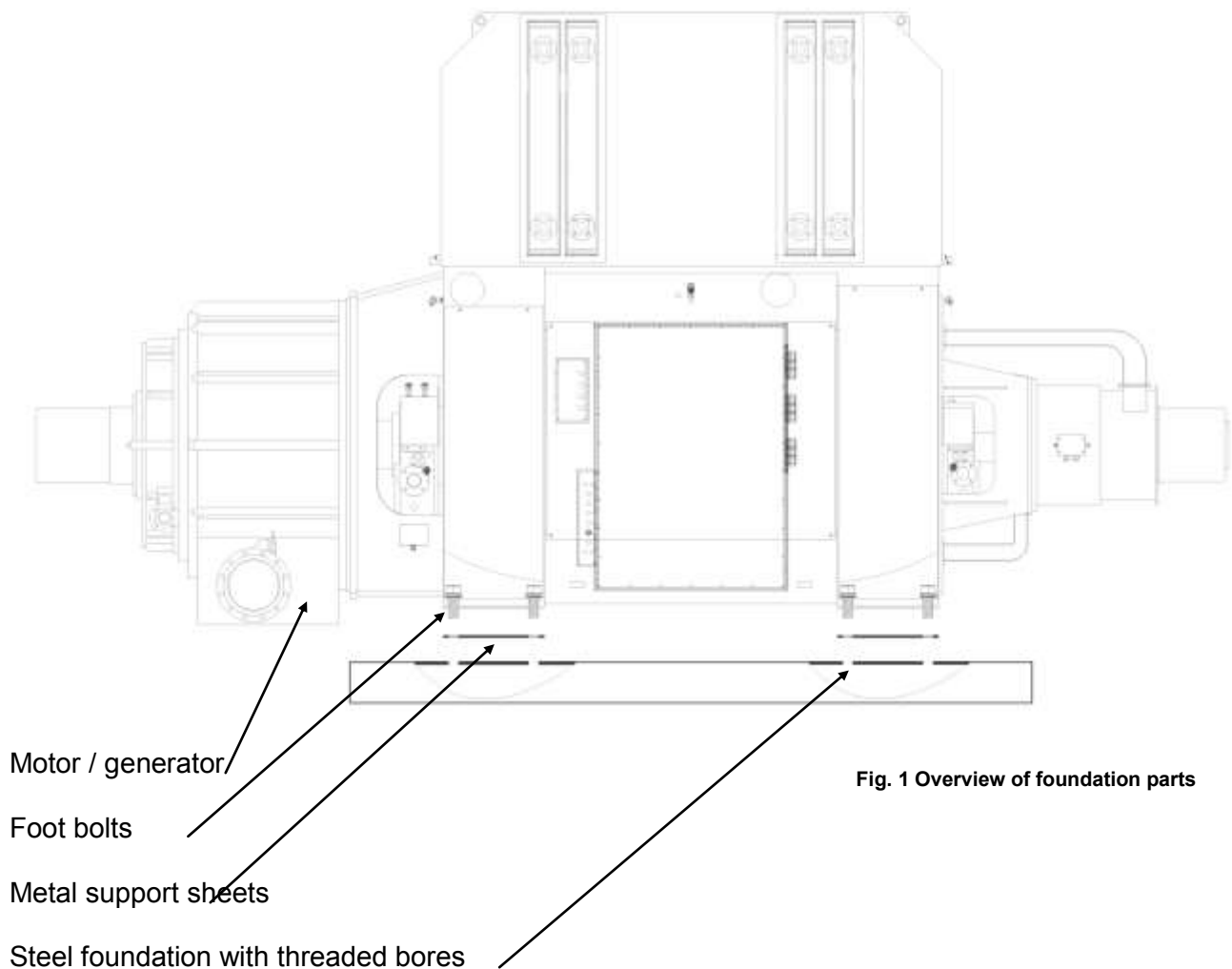
**If there is excessive vibration after alignment, recheck the alignment when the machine is at operating temperature!**

<b>DANGER</b>	<b>Risk of injury and damage from rotating parts!</b>
	All rotating parts must be protected so that they cannot be inadvertently touched. Always observe the applicable regulations and instructions!

<b>WARNING</b>	<b>Risk of injury and damage from incorrect transport!</b>
	For transportation, the motor/generator must be attached at the lifting eyes provided. Do not attach any additional loads to the motor/generator, as the lifting eyes are dimensioned to carry to the motor/generator weight only.

<b>CAUTION</b>	<b>Risk of injury and damage due to incorrect use of the transport securing device!</b>
	The motor/generator is protected with a transport securing device against damage to the bearings. Do not remove this securing device until commissioning! If the machine is to be transported again at a later stage, insert the securing device!

## 4.2 Overview



## 4.3 Required tools/auxiliary material

- Crane and suitable lifting tackle (hydraulic rams, etc.) according to the data on the dimensional drawing of the motor/generator
- Socket wrench set up to size 75 for fixture to foundation
- Torque wrench
- 2 dial gauges including holders (alternative: laser levelling system) to check the alignment
- Dial gauges for the connection of tilting feet\*
- Metal support sheets
- Special tools for the installation of the machine according to the dimensional drawing of the motor/generator (if required)

\*tilting foot: If there is a difference in level between the motor/generator supports, one speaks of a tilting foot. This occurs, if the foundation is not properly levelled, if the support sheets are not properly positioned or if the housing is misaligned due to incorrect handling.

#### 4.4 Positioning of the motor/generator

If the motor/generator is to be positioned on a steel foundation using foot bolts, check the support surfaces of the motor/generator and the foundation for horizontal level, clean surface and proper fit.

After all foundation parts have been inspected, the motor/generator must now be positioned on the foundation without causing any impact.

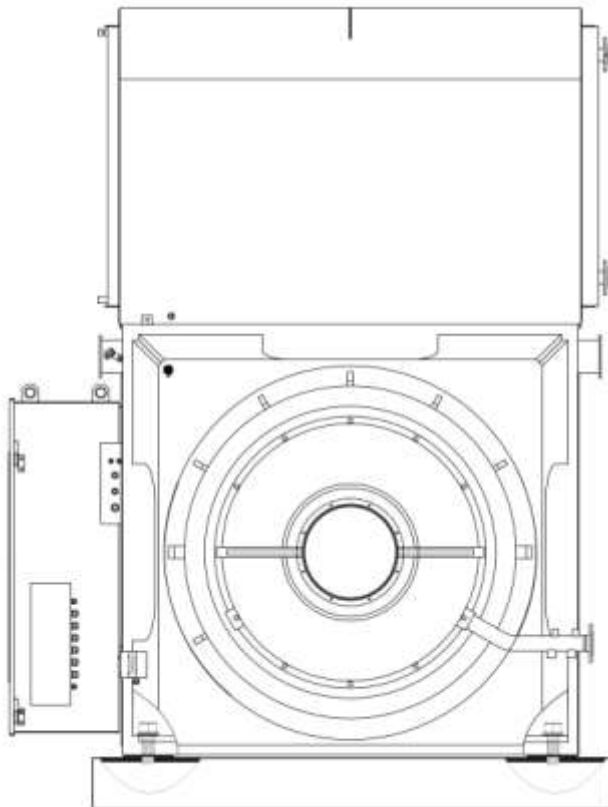


Fig. 2 Motor/generator positioned on the foundation

When the motor/generator is safely placed on the foundation, pre-align it.



#### 4.4.1 Magnetic centre

To prevent axial forces acting on the motor/generator, the unit must be aligned relative to the magnetic centre of the rotor.

The magnetic centre is marked by a groove at the shaft end and an indicator, which indicates the distance to the groove. If the indicator point and the groove are aligned with each other (fig. 4), the rotor is properly aligned to its magnetic centre.

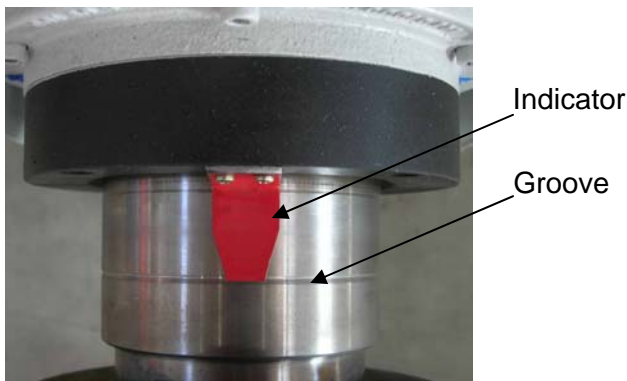


Fig. 3

## 5 Alignment

### 5.1 Preliminary alignment

- During the preliminary alignment, the motor/generator is aligned to the working machine. Refer to the specific data (vertical offset, horizontal offset, etc.) of the working machine.
- Also take into account the magnetic centre of the rotor.
- All connecting dimensions must be adhered to (see dimensional drawing).

### 5.2 Final alignment

- Align the motor/generator so that all prescribed tolerances and the horizontal and vertical offsets are adhered to. To do this, use the adjusting angle, dial gauges or laser levelling equipment.
- Correct vertical alignment by adding or removing metal support sheets.
- During the final alignment, check the motor/generator for tilting feet.
- After successful final alignment, secure the motor/generator to the foundation, applying the installation instructions on dimension drawing or the preliminary tightening torques specified below.
- Check the alignment of the motor/generator and the working machine again. Secure the motor/generator in the correct position, using tapered pins or adjusting angles, if required.

### 5.3 Preliminary tightening torques

Foot bolt	Quality	Preliminary tightening torque (kN)
M30	5.6	117
M36	5.6	172
M42	5.6	237
M48	5.6	312
M52	5.6	374
M56	5.6	482
M30	8.8	269
M36	8.8	391
M42	8.8	542
M48	8.8	713
M52	8.8	856
M56	8.8	927

Thread friction coefficient 0.12

#### 5.3.1 Angular misalignment and axial measurement (Fig.4)

Adjust the axial gap between the half-couplings (E) according to the specifications of the coupling manufacturer.

Deviations must be eliminated by inserting suitable support sheets. The maximum permissible axial offset is 0.2 mm for rigid couplings and 0.5 mm for flexible couplings

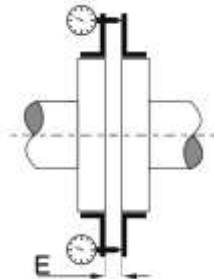


Fig. 4

#### 5.3.2 Radial measurement (Fig.5)

Deviations must be eliminated by inserting suitable support sheets. The maximum permissible radial offset is 0.2 mm for rigid couplings and 0.5 mm for flexible couplings

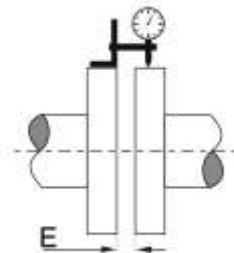


Fig. 5

## 5.4 Alignment log

After successful alignment, record all measurements and have them confirmed by the motor/generator manufacturer and the working machine manufacturer!

For log, see [appendix](#).

## 5.5 Commissioning clause

The contractor shall commission/align the unit according to the protocol (see [appendix](#)) with the motor delivery in order to prevent potential assembly flaws and gain reference values for subsequent on-site measurements.

In cases where the unit is commissioned by the contractor or one of his subcontractors, the procedure must be completed as laid down in the protocol. The contractor shall be liable for any defects resulting from non-compliance with the instructions in the protocol, and it is the duty of the contractor to provide evidence for his compliance with these instructions.

If the motor/generator is installed and commissioned by a party other than the manufacturer, the manufacturer reserves the right to inspect all associated documents (alignment logs, etc.) for assessment and evaluation. If no such data is available, ELIN Motoren shall reject any claims made under warranty.

## 6 Revision log

Date of issue	Issue	Modified page	Type of modification
20.01.2010	01	---	Revision / hg-gh
6.02.2010	02	div.	Amendments by TE & TP-R

## 7 Appendix

[Log for the alignment of machines with dial gauge](#)

QC2-EMG56-008 2 pages

[Commissioning log“](#)

QC2-EMG56-004 6 pages

## Adjustment of motors and generators by using dial gauges

Revision: 01  
Date: 26.03.2003

**QC2-EMG56-008**

<b>order no:</b> Mat.-Nr:	<b>reference:</b> Kennwort:
<b>serial no:</b> Fabr.-Nr.:	<b>customers order:</b> Kundenauftrag:
<b>type:</b> Type:	<b>component:</b> Bauteil:

### Thermal growth at 20°C ambient temperature:

generator/motor : ..... mm

coupled with ..... : ..... mm

### Tolerance for the adjustment acc. coupling supplier:

Axial: max: ..... mm  
actual measure : ..... mm

Radial max: ..... mm  
actual measure: ..... mm

### Remark:

These measures include the adjustment measures of the gearbox and working machine.

During the adjustment it must be taken into account, that all axial centers must be aligned properly even at operating temperature.

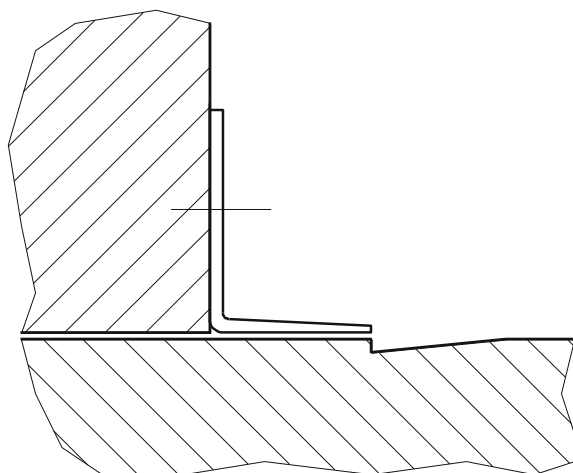
If no thermal growth is stated, the shafts must be coupled for a height increment of zero.

## Adjustment of motors and generators by using dial gauges

Revision: 01  
Date: 26.03.2003

**QC2-EMG56-008**

<b>order no.:</b> Mat.-Nr.:	<b>serial no.:</b> Fabr.-Nr.:
--------------------------------	----------------------------------



sleeve bearing ☐ roller, ball bearing ☐

magnetic center adjusted:

yes ☐ no ☐

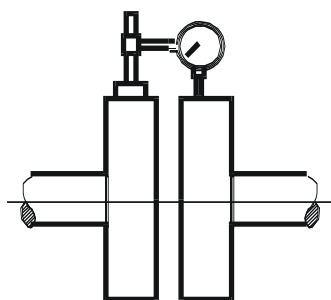
shrunk on coupling: ☐

cold-mounted coupling: ☐

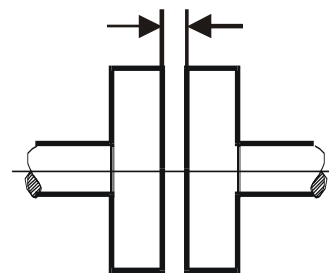
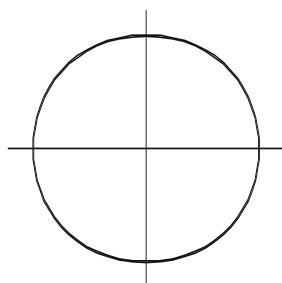
hydraulic mounted coupling: ☐

distance of the coupling half: ..... +/- .....mm

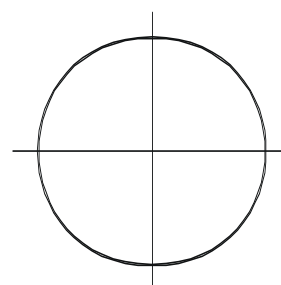
actual measure: .....mm



radial



axial



Motor/generator is ready for operation: yes ☐

no ☐

The subscribers declare, that the findings on page 1 and 2 are suitable for an proper adjustment.

<b>Date:</b>	<b>Customer's supervisor:</b>	<b>ELIN Motoren engineer:</b>
--------------	-------------------------------	-------------------------------

## Commissioning Report

<b>Anlage:</b> Plant:	<b>Kunde:</b> Customer:
<b>Objekt:</b> Object:	<b>Typ:</b> Type:
<b>Material-Nr.:</b> Material no.:	<b>Fabrikations-Nr.:</b> Serial no.:

<b>Commissioning</b> (Inbetriebnahme) <sup>1</sup>
<b>Inbetriebnahmebeginn</b> Start of commissioning
<b>Inbetriebnehmer</b> Commissioning technician
<b>Firma</b> Commissioning company

<b>Infrastructure</b> (Infrastruktur)		
1. location and condition of site (Aufstellungsort)		
2. type of foundation (Fundamentart)		
3. working machine (Arbeitsmaschine)		
4. type of coupling (Kupplungsart): <input type="checkbox"/> rigid (starr) <input type="checkbox"/> flexible (flexibel)		
5. fastening (Befestigung, Verankerung)	Screwed down in accordance with regulations (Schrauben vorschriftsmäßig angezogen)	
	Foot rest bolted (Maschinenfüße verstiftet)	

<b>Transportation Lock, Cover Plates</b> (Transportsicherungen, Abdeckplatten)		
1. transportation lock, shock struts (Transportsicherung, Stützstreben)	Provided (YES / NO) (Mitgeliefert (JA / NEIN))	
	Unfixed? (Gelöst?)	
2. cover plates (Abdeckplatten)	Shipping plates removed from fan casing? (Alle Transportabdeckplatten unter dem Kühlgehäuse entfernt?)	
	Cover plates fixed? Abdeckungen und Deckplatten wieder verschlossen?	

**Commissioning Report**  
(Inbetriebnahmeprotokoll)

Issue: 02  
Date of issue: 13.05.2004

**QC2-EMG56-004e**

<b>Electrical Check</b> (Elektrische Kontrolle)			
<b>0. ambient temperature</b> (Umgebungstemperatur)	[°C]		
<b>1. check of monitoring unit</b> (Kontrolle der Überwachungseinheit)	Terminal check (Klemmenüberprüfung)		
	<input type="checkbox"/> directly (direkt) <input type="checkbox"/> via control station (über Leitstand)		
	PT 100, winding, pcs(Stk): _____ (PT 100, Wicklung)	resistance [Ω] <table border="1" style="display: inline-table; width: 150px; height: 20px;"></table>	
	PT 100, AS-bearing, pcs: _____ (PT 100, AS-Lager)	resistance [Ω] <table border="1" style="display: inline-table; width: 150px; height: 20px;"></table>	
	PT 100, BS-bearing, pcs: _____ (PT 100, BS-Lager)	resistance [Ω] <table border="1" style="display: inline-table; width: 150px; height: 20px;"></table>	
Other (andere): _____			
<b>2. insulation measurement</b> (I-Wert Messung)  1kV, DC, 1min  <input type="checkbox"/> at terminals (an Maschinenklemmen) <input type="checkbox"/> including feed lines (inkl. Zuleitungen)	collector ring resistance (Schleifringwiderstand)	_____ Ω	
	magnet wheel resistance (Polradwiderstand)	_____ Ω	
	Rotor resistance (Rotorwiderstand)	_____ MΩ	
	2a. insulation measurement Stator, neutral point closed	Stator resistance _____ Ω	
	2b. insulation measurement Stator, neutral point open (Sternpunkt offen)	Stator resistance U-ground, _____ Ω	
		Stator resistance V-ground, _____ Ω	
		Stator resistance W-ground, _____ Ω	
	<b>3. Stop period heating functional</b> (Stillstandsheizung funktionstüchtig)	Power (Leistung)	_____ W
		Voltage (Spannung)	_____ V
Resistance measured (Widerstand gemessen)		_____ Ω	
<b>4. slip ring and brush lifting device</b> (Schleifring mit Bürstenabhebevorrichtung)	out of action (Kalttest)		
	in operation (in Betrieb)		
<b>5 starter</b> (Anlasser) oil cooled (Öl) <input type="checkbox"/> Soda <input type="checkbox"/>	fill level of cooling agent (Füllstand des Kühlmediums)		

**Material and Serial Number** (Material- und Fabrikationsnummer):

<b>Mechanical Check</b> (Mechanische Kontrolle)		
<b>1. sliding contact bearing with ring lubrication</b> (Gleitlager mit Ringschmierung)	bearing check (Lager ausgebaut und kontrolliert)	
	type of lubricant (Öltype)	
	lubricant quantity (Ölmenge) [L]	
	revolving lubrication ring (Schmierring funktionstüchtig)	
<b>2. sliding contact bearing with forced feed lubrication</b> (Gleitlager mit Druckumlaufschmierung)  oil feed (Ölversorgung):  <input type="checkbox"/> separate for engine (separat für die Maschine)  <input type="checkbox"/> combined oil feed (Gesamtölanlage)	bearing check (Lager ausgebaut und kontrolliert)	
	pipng (Leitungen gespült?)	
	free from leakage (keine Ölleckagen sichtbar)	
	type of lubricant (Öltype)	
	lubricant quantity (Ölmenge) [L]	
	oil pressure (Öldruck) [bar]	
	revolving lubrication ring (Schmierring funktionstüchtig)	
<b>3. rolling contact bearing</b> (Wälzlager)  <input type="checkbox"/> regreasing yes (nachgeschmiert ja) <input type="checkbox"/> regreasing no (nachgeschmiert nein)	check on noises (auf Geräusche überprüft)	
	dust protection check Optische Kontrolle von Lagerstaubschutz (V-Ring)	
	type of lubricant (Fetttype)	
	temperature AS bearing (AS Temperatur) [°C]	
	temperature BS bearing (BS Temperatur) [°C]	
<b>4. brush check</b> (Bürstenüberprüfung)	pressure (Druck) [N]	
<b>5. cooling agent piping</b> (Kühlanschlüsse, Zu- und Ablauf)	free from leakage (keine Leckagen sichtbar)	
<b>6. alignment check</b> (Ausrichtkontrolle lt. QC2-EMG56-006)		



**Commissioning Report  
(Inbetriebnahmeprotokoll)**

Issue: 02  
Date of issue: 13.05.2004

**QC2-EMG56-004e**

<b>Idling Check (no load operation, declutched)</b> Leerlaufkontrolle (Drehrichtung, ohne Last, ungekuppelt)		
<b>1. check on direction of rotation</b> (Drehrichtungskontrolle)	declutched (ungekuppelt)	
	according to clutching report (lt. Kupplungsprotokoll)	
<b>2. magnetic centre</b> (Magnetisches Mittel)		
<b>3. vibration test</b> (Schwingungsmessung)	AS_X, [mm/s]	
	AS_Y, [mm/s]	
	AS_Z, [mm/s]	
	BS_X, [mm/s]	
	BS_Y, [mm/s]	
	BS_Z, [mm/s]	
<b>4. SPM</b>	AS [dBi]	
	AS [dBc]	
	AS [dBm]	
	BS [dBi]	
	BS [dBc]	
	BS [dBm]	

<b>Load Operation</b> (Lastlauf)	<ul style="list-style-type: none"> <li>See attachment 1 (page 6) and / or other attachments e.g control station print out ... (Siehe Anhang 1 (Seite 6) und / oder Beilagen)</li> <li>Recomendation: Data collection every 15 – 20 minutes Exception: vibration measurement hourly (Empfehlung: Aufnahme der Werte etwa alle 15-20 Minuten, Ausnahme Schwingungsmessung: Aufzeichnung der Werte etwa stündlich)</li> </ul>
----------------------------------	--

**Commissioning Report**  
(Inbetriebnahmeprotokoll)

Issue: 02  
Date of issue: 13.05.2004

**QC2-EMG56-004e**

**Material and Serial Number** (Material- und Fabrikationsnummer):

**Remarks / Reservations** (Anmerkungen / Vorbehalte)

**1. Customer** (Kunde)

**2. Technician** (Monteur)

Above data are confirmed by my signature.

(Mit meiner Unterschrift bestätige ich die Richtigkeit der obigen Angaben.)

Customer (Kunde)

Technician (Monteur)

\_\_\_\_\_  
date, signature (Datum, Unterschrift)

\_\_\_\_\_  
date, signature (Datum, Unterschrift)



**CE-Konformitätserklärung / Einbauerklärung**  
**EC-Declaration of Conformity / of Incorporation**

HS norm  
Page 1 / 2

**abgefasst als / drawn up according to:**  
Einbauerklärung gemäß 2006/42/EG, Anhang II, 1B  
*Declaration of Incorporation according to 2006/42/EC, Annex II, 1B*

**Hersteller:** ELIN Motoren GmbH  
*Manufacturer:* Elin-Motoren-Straße 1  
A-8160 Preding/Weiz, Österreich

**Beschreibung der Komponente:** Drehstrom Asynchron-/Synchronmotoren und -generatoren  
*Description of product:* Three-phase asynchronous /synchronous motors and generators

**Typ:** HKx, HCx, HRx, HTx, HSx

**Fabrikationsnummer:** ab 11001  
*Serialnumber:* as of 11001

**Als Hersteller drehender, elektrischer Maschinen bescheinigen wir, dass oben genannte Komponente den einschlägigen Anforderungen folgender Europäischer Richtlinien entspricht:**

*As a manufacturer of rotating electrical machines we hereby confirm the conformity to the essential requirements of the above product with the following European Directives:*

**2006/42/EG**                      **Maschinenrichtlinie**  
*2006/42/EEC*                      *Machinery Directive*

**Weitere angewandte Richtlinien / Further applied directives:**  
**2004/108/EG**                      **EMV-Richtlinie**  
*2004/108/EEC*                      *EMC Directive*

**Anmerkung:** Die Einhaltung der Schutzziele nach **2006/95/EG Niederspannungsrichtlinie** wurde gemäß Anhang I, Nr. 1.5.1 der Richtlinie 2006/42/EG sichergestellt.

*Note: The compliance with the safety objectives set out in 2009/95/EC Low Voltage Directive is ensured in accordance with Annex I, No. 1.5.1 in Directive 2006/42/EC.*

**Ort, Datum:** Weiz, 13.12.2011  
*Place, date*

  
**Ing. Gustav Hauschka**  
**Geschäftsführer**  
*managing director*

  
**DI Dr. Bernhard Brandstätter**  
**Leitung Technologie**  
*head of technology*

**We Keep the  
World in Motion.**

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Gesellschaftssitz Krottendorf,  
registriert beim Handelsgericht Graz unter  
FN 58429a; UID: ATU 1477 3404; DVR 0748897

[www.elinmotoren.at](http://www.elinmotoren.at)

## **CE-Konformitätserklärung / Einbauerklärung** **EC-Declaration of Conformity / of Incorporation**

HS norm  
Page 2 / 2

**abgefasst als / drawn up according to:**  
Einbauerklärung gemäß 2006/42/EG, Anhang II, 1B  
*Declaration of Incorporation according to 2006/42/EC, Annex II, 1B*

**Die technischen Unterlagen nach 2006/42/EG, Anhang VII B sind erstellt und werden auf begründetes Verlangen den Markaufsichtsbehörden durch unsere Dokumentationsstelle elektronisch übermittelt.**

*Relevant documentation according 2006/42/EC Annex VII B is available and will be transmitted electronically on request by national authorities via our documentation center.*

**Bevollmächtigter für die Zusammenstellung  
der technischen Dokumentation:**  
*Authorized person to compile the technical file:*

**Rauchenberger Friedrich**  
**PA2 / Technische Auftragsabwicklung**  
**ELIN Motoren GmbH**  
**A-8160 Preding/Weiz**

**Für die Drehstrommaschine kommen die grundlegenden Sicherheits- und Gesundheitsschutzanforderungen gemäß Maschinenrichtlinie 2006/42/EG, Anhang I, Punkt 1. zur Anwendung und werden eingehalten. Die Sicherheitshinweise in der mitgelieferten Produktdokumentation sind unbedingt zu beachten.**

**Diese Maschine ist für einen ganz bestimmten, im Benutzerhandbuch spezifizierten Zweck vorgesehen und wird dazu mit anderen Komponenten zu einem Gesamtsystem zusammengefügt. Für den Betrieb der Maschine muss sichergestellt sein, dass auch dieses Gesamtsystem entsprechende Bestimmungen und Sicherheitsanforderungen, einschließlich jene der Richtlinie 2006/42/EG, erfüllt.**

*Please note: For the above three-phase machine, the essential health and safety requirements of the Machinery Directive 2006/42/EC, Annex I, No. 1, are applied and fulfilled. Safety instructions given in the product documentation must be observed.*

*This machine is designed for a particular purpose. In order to fulfill this purpose it will be joined with other components. The final machinery must not be operated until corresponding provisions and safety regulations, including directive 2006/42/EEC, are fulfilled.*

### **Das umseitig angeführte Produkt entspricht unter anderem folgenden Normen:**

*Above product complies among other things with the following standards:*

<b>EN 12100</b>	<b>Sicherheit von Maschinen - Allgemeine Gestaltungsgrundsätze - Risikobewertung und Risikominderung (ISO 12100:2010)</b>
<i>EN 12100</i>	<i>Safety of machinery - General principles for design - Risk assessment and risk reduction (ISO 12100:2010)</i>
<b>EN 60034 Reihe</b>	<b>Drehende elektrische Maschinen</b>
<i>IEC 60034 series</i>	<i>Rotating electrical machines</i>
<b>EN 60204-11</b>	<b>Sicherheit von Maschinen - Elektrische Ausrüstung von Maschinen - Teil 11: Anforderungen an Hochspannungsausrüstung</b>
<i>EN 60204-11</i>	<i>Safety of machinery - Electrical equipment of machines - Part 11: Requirements for HV equipment</i>

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Gesellschaftssitz Krottendorf,  
registriert beim Handelsgericht Graz unter  
FN 58429a; UID: ATU 1477 3404; DVR 0748897

[www.elinmotoren.at](http://www.elinmotoren.at)

# Eichreihe für Platin-Widerstandsthermometer Calibration for Platinum-Resistance Thermometers

°C	Ohm	°C	Ohm
-100	59,90	+ 11	104,33
- 95	61,95	+ 12	104,72
- 90	64,00	+ 13	105,11
- 85	66,04	+ 14	105,50
- 80	68,08	+ 15	105,90
- 75	70,11	+ 16	106,29
- 70	72,14	+ 17	106,68
- 65	74,15	+ 18	107,07
- 60	76,18	+ 19	107,45
- 55	78,19	+ 20	107,83
- 50	80,20	+ 25	109,76
- 45	82,20	+ 30	111,70
- 40	84,20	+ 35	113,63
- 35	86,19	+ 40	115,56
- 30	88,18	+ 45	117,49
- 25	90,11	+ 50	119,42
- 20	92,14	+ 55	121,34
- 15	94,06	+ 60	123,26
- 10	96,08	+ 65	125,17
- 9	96,45	+ 70	127,08
- 8	96,85	+ 75	128,99
- 7	97,25	+ 80	130,90
- 6	97,64	+ 85	132,80
- 5	98,03	+ 90	134,70
- 4	98,42	+ 95	136,60
- 3	98,72	+ 100	138,50
- 2	99,21	+ 110	142,28
- 1	99,61	+ 120	146,04
0	100,00	+ 130	149,78
+ 1	100,39	+ 140	153,52
+ 2	100,79	+ 150	157,24
+ 3	101,18	+ 160	160,96
+ 4	101,58	+ 170	164,66
+ 5	101,97	+ 180	168,36
+ 6	102,36	+ 190	172,04
+ 7	102,75	+ 200	175,70
+ 8	103,15		
+ 9	103,54		
+ 10	103,92		

Projektname / Project name:	Nantong II		
Maschinentyp / Type of machine:	HKG545G04	Mat.Nr./Mat.nr.:	526886

## Richtwerte für die Einstellung der Auslösewerte Standard values for the calibration of the actuating values

### ***Vor Inbetriebnahme Before start up***

<i><b>Meßstellen Measuring points</b></i>	<i><b>Warnung Warning</b></i>	<i><b>Abschaltung Trip</b></i>
Ständerwicklung Ausnutzung Erwärmungskl. B Stator Winding acc. to temp. rise Cl. B	125 °C	130 °C
Wälzlager Antifriction bearing	95 °C	100 °C
Grenzwerte der maximalen Wellenschwingung (Sp-p) nach DIN ISO 7919-3 Limit value for the maximum shaft vibration (Sp-p) acc. DIN ISO 7919-3	174 µm	256 µm
Grenzwerte der max. Gehäuseschwinggeschwindigkeit für freie Aufhängung (veff) nach DIN ISO 10816-3 Limit value for housing vibration, free suspension (veff) acc. DIN ISO 10816-3	7,1 mm/s	11,0 mm/s
Grenzwerte der max. Gehäuseschwinggeschwindigkeit für starre Aufspannung (veff) nach DIN ISO 10816-3 Limit value for housing vibration, rigid mounting (veff) acc. DIN ISO 10816-3	4,5 mm/s	7,1 mm/s

Projektname / Project name:	Nantong II		
Maschinentyp / Type of machine:	HKG545G04	Mat.Nr./Mat.nr.:	526886

## Richtwerte für die Einstellung der Auslösewerte Standard values for the calibration of the actuating values

**Unter Berücksichtigung der Basiswerte  $T^*$  und  $BW^{**}$  im Normalbetrieb**  
**Considering the basic data  $T^*$  and  $BW^{**}$  at normal operation**

<b>Meßstellen</b> <b>Measuring points</b>	<b>Warnung</b> <b>Warning</b>	<b>Abschaltung</b> <b>Trip</b>
Ständerwicklung Ausnutzung Erwärmungskl. B Stator Winding acc. to temp. rise Cl. B	$T + 10\text{ K}$ max. 125 °C	$T + 15\text{ K}$ max. 130 °C
Wälzlager Antifriction bearing	$T + 5\text{ K}$ max. 95 °C	$T + 10\text{ K}$ max. 100 °C
Grenzwerte der maximalen Wellenschwingung (Sp-p) nach DIN ISO 7919-3 Limit value for the maximum shaft vibration (Sp-p) acc. DIN ISO 7919-3	$BW \pm 44\text{ }\mu\text{m}$	256 $\mu\text{m}$
Grenzwerte der max. Gehäuseschwinggeschwindigkeit für freie Aufhängung (veff) nach DIN ISO 10816-3 Limit value for housing vibration, free suspension (veff) acc. DIN ISO 10816-3	$BW + 1,8\text{ mm/s}$ max. 8,9 mm/s	11,0 mm/s
Grenzwerte der max. Gehäuseschwinggeschwindigkeit für starre Aufspannung (veff) nach DIN ISO 10816-3 Limit value for housing vibration, rigid mounting (veff) acc. DIN ISO 10816-3	$BW + 1,1\text{ mm/s}$ max. 5,6 mm/s	7,1 mm/s

\*  $T$ =Betriebstemperatur / Operation temperature

\*\*  $BW$ =Gemessene Schwingwerte im Dauerbetrieb / Measured vibration values during operation

Maximalwerte sind zulässige Werte für Dauerbetrieb.

Maximum values are permissible values during continuous operation.



# Failure report for industry machines

## 1. Supplier

Company: ELIN Motoren GmbH ELIN-Motoren-Straße 1 8160 Preding / Weiz Austria	Fax: (++43/3172) 90 606-1506
	Phone: (++43/3172) 90 606-2463
	E-mail: <a href="mailto:contact@elinmotoren.at">contact@elinmotoren.at</a>
Contact persons department services:	Mr. Christian Lindner, Mr. Josef Nistelberger Mr. Manfred Schlagbauer

## 2. Customer

Company:	Fax:
	Phone:
	E-mail:
Contact person:	
Address of the plant:	<input type="checkbox"/> Description of way

## 3. Machine data

Serial number:	First starting up:
Project name:	Running hours:

## 4. Failure description

Date of breakdown:	Initiated by:
Failure description:	
Attach possibly existing recordings please!	
Plant in operation: <input type="checkbox"/> YES <input type="checkbox"/> NO	