Synchronous/induction motors 1PH813

Operating Instructions · 04/2009

SIEMENS

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Operating Instructions

04/2009
610.48000.22

Legal information

Warning notice system

This manual contains notices you have to observe in order to ensure your personal safety, as well as to prevent damage to property. The notices referring to your personal safety are highlighted in the manual by a safety alert symbol, notices referring only to property damage have no safety alert symbol. These notices shown below are graded according to the degree of danger.

⚠DANGER
indicates that death or severe personal injury **will** result if proper precautions are not taken.

⚠WARNING
indicates that death or severe personal injury **may** result if proper precautions are not taken.

⚠CAUTION
with a safety alert symbol, indicates that minor personal injury can result if proper precautions are not taken.

CAUTION
without a safety alert symbol, indicates that property damage can result if proper precautions are not taken.

NOTICE
indicates that an unintended result or situation can occur if the corresponding information is not taken into account.

If more than one degree of danger is present, the warning notice representing the highest degree of danger will be used. A notice warning of injury to persons with a safety alert symbol may also include a warning relating to property damage.

Qualified Personnel

The device/system may only be set up and used in conjunction with this documentation. Commissioning and operation of a device/system may only be performed by **qualified personnel**. Within the context of the safety notes in this documentation qualified persons are defined as persons who are authorized to commission, ground and label devices, systems and circuits in accordance with established safety practices and standards.

Proper use of Siemens products

Note the following:

⚠WARNING
Siemens products may only be used for the applications described in the catalog and in the relevant technical documentation. If products and components from other manufacturers are used, these must be recommended or approved by Siemens. Proper transport, storage, installation, assembly, commissioning, operation and maintenance are required to ensure that the products operate safely and without any problems. The permissible ambient conditions must be adhered to. The information in the relevant documentation must be observed.

Trademarks

All names identified by ® are registered trademarks of the Siemens AG. The remaining trademarks in this publication may be trademarks whose use by third parties for their own purposes could violate the rights of the owner.

Disclaimer of Liability

We have reviewed the contents of this publication to ensure consistency with the hardware and software described. Since variance cannot be precluded entirely, we cannot guarantee full consistency. However, the information in this publication is reviewed regularly and any necessary corrections are included in subsequent editions.

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Introduction 1

1.1 About these operating instructions

These operating instructions describe the motor and explain how to handle the motor from the delivery to the disposal stage.

Before you start using the motor, you must read these operating instructions to ensure safe, problem-free operation and to maximize the service life.

These operating instructions complement the relevant SIEMENS configuration manual.

Siemens strives continually to improve the quality of information provided in these operating instructions. If you find any mistakes or would like to offer suggestions about how this document could be improved, please contact the Siemens Service Center.

Always follow the safety instructions and notices in these operating instructions. The warning notice system is explained on the rear of the inside front.

Text format features

In addition to the safety-related notices and instructions which you must read, you will find the text in these operating instructions is formatted in the following way:

1. Handling instructions are always formatted as a numbered list. Always perform the steps in the order given.

- Lists are formatted as bulletted lists.
  - Lists on the second level are hyphenated.

Note

A Note is an important item of information about the product, handling of the product or the relevant section of the document. Notes provide you with help or further suggestions/ideas.

Safety information 2

2.1 General safety information

Safety and commissioning information for converter-fed low-voltage three-phase motors

⚠ DANGER
All activities associated with transporting, connecting, commissioning, and maintaining the motors must be carried out by properly trained, responsible personnel (DIN EN 50110-1; note IEC 60364). Failure to follow proper procedures may result in injury or material damage.

Special versions and construction variants may differ with respect to certain technical aspects. If in doubt, you are strongly advised to contact the manufacturer specifying the type designation and serial number (see rating plate) or arrange for any maintenance work to be carried out by the SIEMENS Service Center.

Systems and machines with converter-fed low-voltage three-phase motors must fulfill the protective requirements of the EMC Directive.

The machine manufacturer is responsible for ensuring that installation is carried out properly. The signal and power cables to the motor must be shielded.

The information provided by the converter manufacturer regarding EMC-compliant installation must be observed.

Proper usage

These motors are designed for use in industrial or commercial systems. They comply with the EN 60034-1 standards and the relevant associated sections.

⚠ WARNING
It is forbidden to install them in hazardous areas unless they are explicitly designed for this.

If more stringent requirements are necessary in special cases (e.g. shock-hazard protection in non-commercial applications where children are likely to be present), the customer must implement the relevant measures to ensure that these requirements are fulfilled.

Any alternative requirements specified on the rating plate must be taken into account. The on-site conditions must comply with the rating plate specifications.

The motors are designed for use in sheltered areas under normal climatic conditions, such as those found in production halls.

2.2 Safety and operating instructions

The safe use of electrical machines

⚠ WARNING

Rotating or live parts

Rotating or live parts are dangerous.

Fatal or severe injuries and substantial material damage can occur if the required covers are removed or if the machines are not handled, operated, or maintained properly.

Covers must only be removed and the motor operated in accordance with the relevant regulations. The motor must be maintained on a regular basis.

Qualified personnel

These operating instructions only contain the information necessary for ensuring that the motor is operated by properly trained personnel in accordance with its intended purpose.

Those responsible for plant safety must ensure the following:

- The basic planning work for the system and all work relating to transportation, assembly, installation, commissioning, maintenance and repairs is carried out by qualified personnel and checked by responsible, suitably skilled personnel.
- The operating instructions and the motor documentation are available at all times.
- The technical data and specifications relating to installation, connection, ambient and operating conditions are taken into account at all times.
- The system-specific installation and safety regulations are observed.
- Personal protective equipment is used.
- Unqualified persons must not work on or in the vicinity of these motors at any time.
- If the motors are used outside industrial areas, the installation site must be protected against unauthorized access by means of suitable protection facilities (e.g. safety fences and warning signs).

Note

Siemens Service Center

You are advised to contact your nearest Siemens Service Center to request their services and support for planning, installation, commissioning, and maintenance activities.

2.3 Observing the five safety rules

For your personal safety and to prevent material damage when working on the machine, always observe the safety instructions and the following five safety rules. Apply the five safety rules in the order stated before starting work at the machine.

Five safety rules

1. Disconnect the system.

   You must also make sure that the auxiliary circuits are also disconnected.
2. Protect against reconnection.
3. Make sure that the equipment is at zero voltage
4. Ground and short-circuit
5. Cover or enclose adjacent components that are still live.

When work has been completed, remove these measures in reverse order.

2.4 Thermal hazard

⚠ CAUTION

The surface temperature of the motors can exceed 100°C.

Do not touch hot surfaces!

Temperature-sensitive components (electric cables, electronic components) must not be placed on hot surfaces. If the motors overheat, this can destroy the windings/bearings and the permanent magnet may become demagnetized

Only operate the motors in conjunction with effective temperature control.

2.5 Information about electromagnetic fields

⚠ WARNING

Electromagnetic fields

Electromagnetic fields are generated when electrical power engineering installations (e.g. transformers, converters, or motors) are operated.

Electromagnetic fields can interfere with electronic devices, which could cause them to malfunction. Heart pacemakers can be affected, for example, which could potentially damage a person's health or even result in death. Steps must be taken, therefore, to ensure that persons with heart pacemakers cannot enter these areas.

The plant operator is responsible for taking appropriate measures (labels and hazard warnings) to adequately protect operating personnel and others against any possible risk.

- Observe the relevant nationally applicable health and safety regulations. In Germany, "electromagnetic fields" are subject to regulations BGV B11 and BGR B11 stipulated by the German statutory industrial accident insurance institution.
- Display adequate hazard warning notices.
- Place barriers around hazardous areas.
- Take appropriate measures (e.g. shields) to reduce electromagnetic fields at their source.

2.6 Electrostatic sensitive devices (ESD)

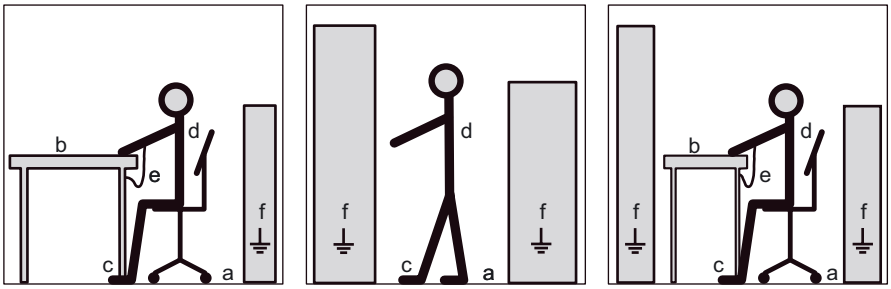
ESD guidelines

CAUTION
Electrostatic discharge Electronic modules contain components that can be destroyed by electrostatic discharge. These modules can be easily destroyed by improper handling. To protect your equipment against damage, follow the instructions given below.

- Never touch electronic modules unless absolutely necessary in the course of maintenance and repair procedures.
- If the modules have to be touched, the body of the person concerned must be electrostatically discharged immediately beforehand and be grounded.
- Electronic modules should not come into contact with electrically insulating materials (e.g. plastic foil, plastic parts, insulating table supports, or clothing made of synthetic fibers).
- Always place the modules on conductive bases.
- Always store and transport electronic modules or components in conductive packaging (e.g. metallized plastic or metal containers).

CAUTION
Use conductive packaging material Electronic modules must be stored, transported, and dispatched in conductive packaging. Electronic modules that are not correctly stored, transported, or dispatched can be damaged. Pack electronic modules in appropriate conductive packaging (e.g. foam rubber or aluminum foil).

The necessary ESD protective measures for electrostatically sensitive devices are illustrated once again in the following drawings:



(1) (2) (3)

(1) Sitting
(2) Standing
(3) Standing/sitting

ESD protective measures

a = conductive floor
b = ESD table
c = ESD footwear
d = ESD coat
s = ESD wrist strap
f = cubicle ground connection

Figure 2-1 ESD protective measures

Description

3

3.1 Application

The 1PH813 three-phase motors are used as industrial drives for tool and production machines. They are designed for use in a wide range of drive engineering applications.

The variable-speed three-phase motors are supplied by a frequency converter and are characterized by their high power density, ruggedness, long lifetime, and overall reliability.

NOTICE
The standard motors are not suitable for use in corrosive atmospheres, atmosphere with a high salt content, or in outdoor applications.

3.2 Rating plate (type plate)

The rating plate (type plate) shows the technical specifications for the supplied motor.

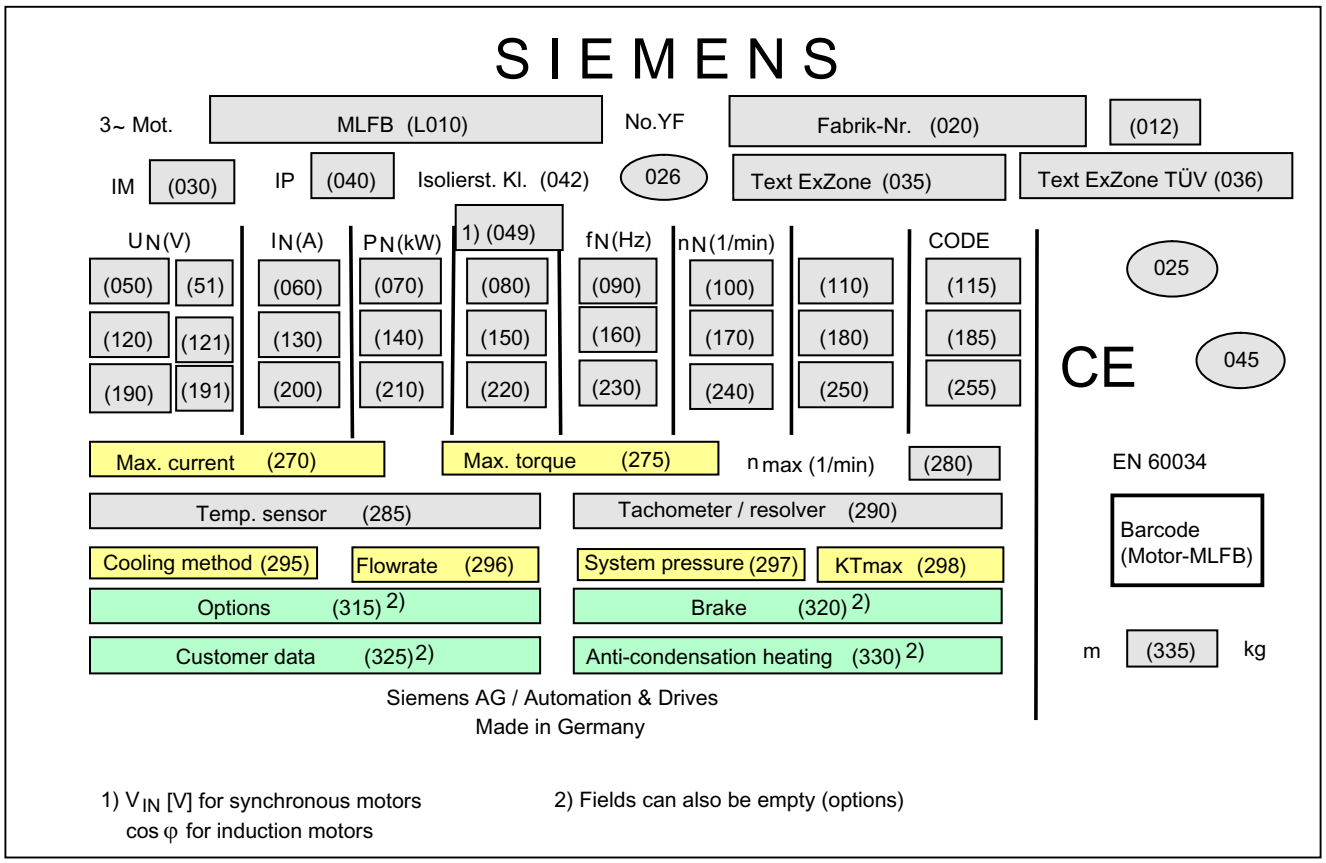


Figure 3-1 Schematic layout of rating plate

Table 3- 1 Elements on the rating plate

No.	Description	No.	Description
010	MLFB	170	Rated speed n_N (2)
012	Consecutive number, part of serial number	180	Operating mode (2)
020	Serial number	185	Code for operating point 2
025	UL mark	190	Rated voltage V_N (3)
026	Graphical symbol zone 2	191	Switching mode 3
030	Type of construction	200	Rated current I_N (3)
035	Identification code zone 2	210	Rated power P_N (3)
036	Protection against explosion	220	cos φ (3)
040	Degree of protection	230	Rated frequency f_N (3)
045	Type of balancing	240	Rated speed n_N (3)
049	For induction motors cos φ	250	Operating mode (3)
	For synchronous motors: induced voltage at rated speed U_{IN}	255	Code for operating point 3
050	Rated voltage V_N (1)	270	Maximum current I_{max}
051	Switching mode 1	275	Maximum torque M_{max}
060	Rated current I_N (1)	280	Maximum speed n_{max}
070	Rated power P_N (1)	285	Temperature sensor
080	cos φ (1)	290	Tachometer/resolver
090	Rated frequency f_N (1)	295	Cooling method
100	Rated speed n_N (1)	296	Throughput l/min (m^3/s)
110	Operating mode (1)	297	System pressure
115	Code for operating point 1	298	Maximum coolant temperature
120	Rated voltage V_N (2)	315	Options (I)
121	Switching mode 2	320	Options (II)
130	Rated current I_N (2)	325	Optional customer information
140	Rated power P_N (2)	330	Anti-condensation heating
150	cos φ (2)	335	Weight
160	Rated frequency f_N (2)		

3.3 Design

3.3.1 Regulations

The motors comply with the following regulations acc. to IEC / EN 60034:

Table 3- 2 Regulations that have been applied

Feature	Standard
Rated and operation characteristics	IEC / EN 60034-1
Degree of protection (1)	IEC / EN 60034-5
Cooling	IEC / EN 60034-6
Type of construction (1)	IEC / EN 60034-7
Noise emission	IEC / EN 60034-9
Temperature monitoring	IEC / EN 60034-11
Vibration severity grades	IEC / EN 60034-14

(1) The degree of protection and type of construction of the motor are stamped on its rating plate.

The three-phase motors comply with the relevant sections of EN 60034 and EN 60204-1. Three-phase motors comply with Low-Voltage Directive 2006/95/EC. Standard motors comply with the UL regulations. "UR" is stamped on the rating plate of these motors.

Low-voltage motors are components designed for installation in machines in accordance with the Machinery Directive. They must not be commissioned until it has been verified that the end product complies with this directive (also take into account EN 60204-1).

Note

Make sure that your end product is in compliance with all of the applicable legislation! The applicable national, local, and system-specific regulations and requirements must be taken into account.

3.3.2 Types of construction

The motor is available in the following basic types of construction as well as other optional types of construction with further potential applications.

Table 3- 3 Types of construction

Shaft height	Standard type of construction	Rotated type of construction
1PH813□	IM B3	IM V5, IM V6
	IM B5	IM V1, IM V3
	IM B35	IM V15, IM V36

Two lifting eyebolts, which can be screwed onto the motor in accordance with its type of construction, are supplied with the motor for transportation purposes.

3.3.3 Degree of protection

1PH813□ motors (self-cooled) are available with degree of protection IP65.

1PH813□ motors (forced ventilation) are available with degree of protection IP55.

1PH813□ motors (water-cooled) are available with degree of protection IP65.

3.3.4 Ambient conditions

The following temperature ranges apply for self-cooled and forced-ventilation motors.

Permissible temperature range during operation: T = -15 °C to +40 °C

Permissible temperature range during storage: T = -20 °C to +70 °C

Under conditions other than those specified above (ambient temperature > 40°C or installation altitude > 1000 m above sea level), the permissible torque/power must be determined from the following table. Ambient temperatures and installation altitudes are rounded off to 5°C and 500 m respectively.

Table 3- 4 Power derating as a function of the installation altitude and ambient temperature

Installation altitude above sea level [m]	Ambient temperature in °C				
	< 30	30 - 40	45	50	55
1000	1.07	1.00	0.96	0.92	0.87
1500	1.04	0.97	0.93	0.89	0.84
2000	1.00	0.94	0.90	0.86	0.82
2500	0.96	0.90	0.86	0.83	0.78
3000	0.92	0.86	0.82	0.79	0.75
3500	0.88	0.82	0.79	0.75	0.71
4000	0.82	0.77	0.74	0.71	0.67

NOTICE
The standard motors are not suitable for use in corrosive atmospheres, atmosphere with a high salt content, or in outdoor applications.

3.3.5 Cooling

Natural cooling

The rated data only applies when the ambient temperature does not exceed 40 °C (104 °F) as a result of the installation conditions.

To ensure sufficient cooling, a minimum clearance of 100 mm from adjacent components must be observed on three sides.

Forced ventilation

This cooling method is implemented by means of a separate ventilation module equipped with a ventilator that operates independently of the motor.

NOTICE
Steps must be taken to ensure that the motor is always operated in conjunction with the separately-driven fan.

The motors must be arranged in such a way that the cooling air can flow in and out without obstruction and that the minimum distance (s) between the inlet/outlet air openings and adjacent components is maintained (see "Minimum distance" diagram below). Steps must be taken to ensure that hot outlet air cannot be drawn back into the system.

The covers (Pos. 1 in "Minimum distance" diagram below), which were removed to allow the motors to be secured, must be reattached before the system is commissioned. The arrow must point upwards.

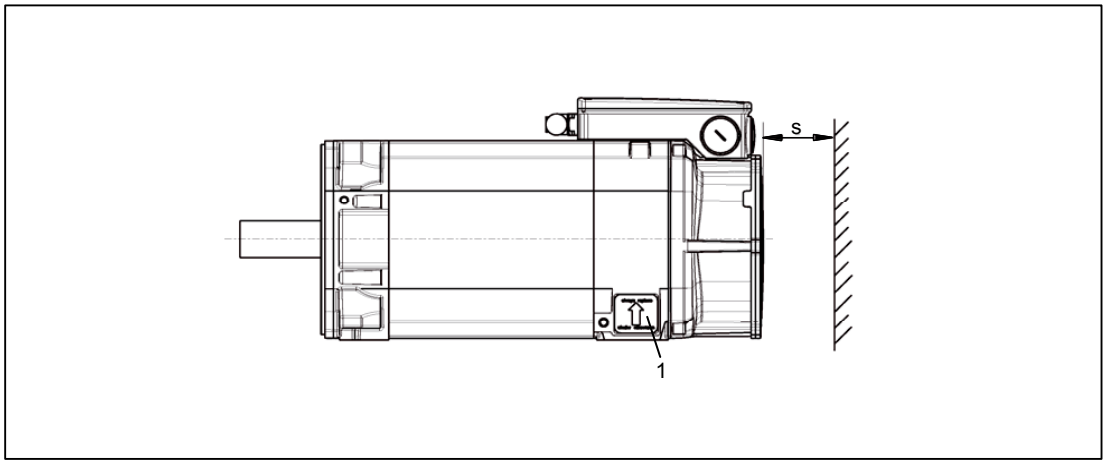


Figure 3-2 Minimum distance (s)

s Minimum distance between inlet/outlet air openings and adjacent components (min. distance for 1PH813□: 60 mm)

1 Cover for NDE mounting foot

Water cooling

The motor can only be operated in a closed cooling-water circuit with a heat-exchanger unit. The motor is connected to the cooling circuit by means of two female threads on the rear of the motor. The operator can decide on the best method of connecting the inlet and outlet.

Cooling water connection	G3/8"
Cooling water flow	12 l/min
Max. pressure at inlet	6 bar
Pressure loss between inlet and outlet	0.9 bar
Min. cooling water inlet temperature	$T_{cooling} > T_{ambient}$ - 5 K
Max. cooling water inlet temperature	+30 °C

Only water enriched with appropriate quantities of additives to protect against corrosion and minimize the growth of algae can be used as a coolant.

If there is a risk of frost, preventive measures must be taken during operation, storage, and transportation (anti-freeze, emptying and blowing out with air, etc.).

A filter (100 µm) must be installed in the inlet pipe to protect the motor against contamination. Additional protection for the motor must be provided by means of a pressure relief valve installed downstream of the filter.

The values specified for the cooling water also apply to the requirements of closed cooling circuits. Not all of the specified concentrations will occur in the cooling water at the same time.

Cables and fittings can be made out of brass, stainless steel, or plastic. If different materials are used in close proximity to each other, however, the electrochemical series must be taken into account, which is why zinc must not be used in cooling water circuits.

If a throttle is needed to restrict the flow, it is best to install it downstream of the motor. It must not be installed directly in front of the inlet because the effects of cavitation may damage the motor.

Table 3- 5 Chemical requirements of the cooling water

Content and chemical composition	Value
pH value	6 - 9
Chloride ions	< 40 ppm
Sulfate ions	< 50 ppm
Nitrate ions	< 50 ppm
Dissolved solids	< 340 ppm
Total hardness	< 170 ppm
Electrical conductivity	< 500 µS/cm
Size of any particles in the coolant	< 100 µm
Tyfocor anti-freeze	20 - 30 %
NALCO 00GE056 inhibitor	0,2 - 0,25 %

3.3.6 Noise emission

When operated in the speed range 0 to 5000 rpm, 1PH813 motors can reach the following measuring-surface sound-pressure level Lp(A):

Cooling method	Measuring-surface sound-pressure level Lp(A)
Self-cooled	70 dB(A) + 3 dB tolerance
Force ventilated	70 dB(A) + 3 dB tolerance
Water-cooled	68 dB(A) + 3 dB tolerance

The motors are certified for a wide range of installation and operating conditions. These conditions such as rigid or vibration-isolated foundation design influence noise emission, sometimes significantly.

Preparations for use

4

4.1 Shipment and packaging

Checking the delivery for completeness

The drive systems are assembled on an individual basis. Upon receipt of the delivery, check immediately whether the items delivered are in accordance with the accompanying documents. Siemens will not accept any claims relating to items missing from the delivery and which are submitted at a later date.

- Report any apparent transport damage to the delivery agent immediately.
- Report any apparent defects/missing components to the appropriate Siemens office immediately.

These safety instructions are part of the scope of supply; keep them in a location where they can be easily accessed.

The rating plate, which is supplied separately, should be located in the vicinity of the motor as an additional means of making the motor data available.

In the case of:

- Motors with terminal boxes: the rating plate is located in the terminal box
- Motors with connectors: the rating plate is included with the material safety sheet

4.2 Transportation and storage

4.2.1 Transport

Use suitable load bearing equipment when transporting and installing the motor. Make sure that all of the available eyebolts are used during transportation. Country-specific regulations must be observed.

If the motor is not to be commissioned immediately following delivery, it must be stored in a dry, dust-free room that is not susceptible to vibration (see "Storage").

⚠WARNING

Hazards during lifting and transport!

Devices and tools that are badly designed, unsuitable, or damaged can result in personal injury and/or material damage.

Lifting devices, industrial trucks, and load bearing equipment must comply with requirements. Pay attention to the lifting capacity of the hoisting gear. Do not attach any additional loads. To hoist the motor, use suitable cable-guidance or spreading equipment (particularly if the motor is equipped with built-on assemblies). The weight of the motor is specified on the rating plate.

⚠WARNING

Transport and lift the motor using the lifting eyebolts

If you lift the motor by the cooling water pipe system, this can damage the pipes and cause the motor to fall to the ground. This can result in death or serious injury as well as damage or write off the motor.

Only lift the motor using the lifting eyebolts on the bearing end shields.

Lifting eyebolts must not be attached to the end of the shaft.

CAUTION

When lifting and transporting the motors by means of the ring bolts supplied (to DIN 580), you must use a cross beam.

Please note:

- The ring bolt must be screwed in completely and secured by hand (approx. 8 Nm). Do not overtighten.
- Do not remove the plain pressboard washer and do not use warped or damaged ring bolts.
- Loads that run transverse to the ring plane are not permitted.
- If the motor is installed with the end of the shaft facing down or up, the lifting eyebolts must be positioned as shown in the diagrams below.

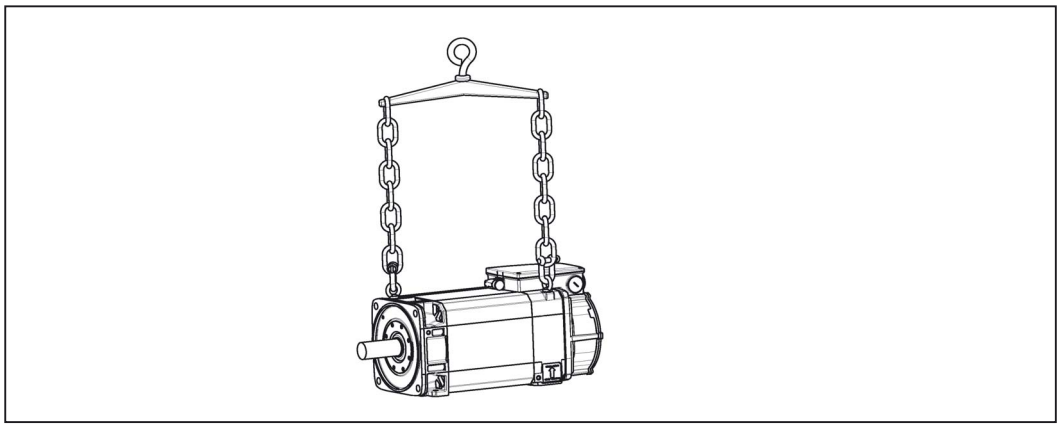
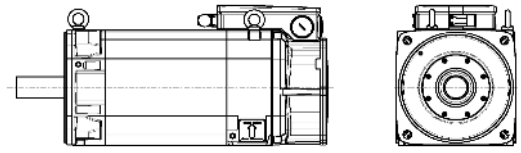
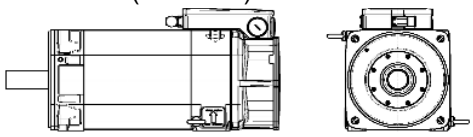


Figure 4-1 Lifting and transporting the motor with a cross beam (example)

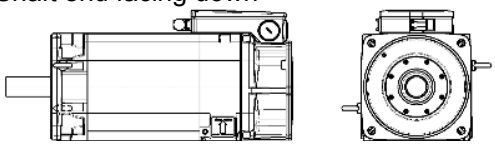
Table 4- 1 Position of the lifting eyebolts



Horizontal (standard)



Shaft end facing down



Shaft end facing up

Transporting a motor that has already been in operation

If you want to transport a motor that has already been in operation, proceed as follows:

1. Allow the motor to cool down.
2. Remove the connections provided by the customer.
3. Empty the motor of any cooling water and purge it carefully with air.
4. Always transport and lift the motor by the lifting eyebolts on the bearing end shields.

4.2.2 Storage

The motors can be stored for up to two years in a dry, dust-free room that is not susceptible to vibration (veff < 0.2 mms^{-1}) without the specified storage time being reduced.

CAUTION
Seizure damage to bearings If the motors are stored incorrectly, bearing seizure damage can occur (e.g. brinelling) as a result of vibrations.

Storing indoors

- Apply a preservation agent (e.g. Tectyl) to bare, external components (e.g. shaft ends) if this has not already been carried out in the factory.
- Store the motor in an area that fulfills the following requirements:
  - Dry, dust-free, frost-free and vibration-free The relative air humidity should be less than 60% and the temperature should not drop below -15 °C (to EN 60034-1).
  - Well ventilated
  - Offers protection against extreme weather conditions
  - The air in the storage area must not contain any harmful gases.
- Protect the motor against shocks and humidity.
- Make sure that motor is covered properly.
- Avoid contact corrosion. You are advised to rotate the end of the shaft manually every three months.

Protection against humidity

If a dry storage area is not available, the following measures must be taken:

- Wrap the motor in humidity-absorbent material and then wrap it in film so that it is air tight.
- Include several bags of desiccant in the seal-tight packaging. Check the desiccant and replace as required.
- Place a humidity meter in the seal-tight packaging to indicate the level of air humidity inside it.
- Inspect the motor on a regular basis.

Long-term storage

If you intend to place the motor in storage for longer than six months, you must check its condition every six months.

- Check the motor for any damage.
- Carry out any necessary maintenance work.
- Document all preservation measures taken so that they can be reversed before the machines are recommissioned.
- Make sure that storage area is air-conditioned.

Condensation water

Condensation water can collect in the machine as a result of sharp fluctuations in ambient temperature, exposure to direct sunlight, high levels of humidity in the storage location, or intermittent operation/variations in load during operation.

CAUTION
Damage caused by condensation water If the stator winding is damp, its insulation resistance decreases. This results in voltage flashovers, which can destroy the winding. Condensation can also cause the inside of the machine to rust.

Protecting the cooling-water system

When the units are delivered, the stainless steel/cast iron cooling-water pipe system is not filled with cooling water.

- When you place the motor in storage after use, drain the cooling water ducts and purge them with air so that they are completely empty.
- To operate the motor, add an anti-freeze agent (e.g Antifrogen or Tyfocor) to the cooling water (max. 20% to 30%).

CAUTION
Frost damage to the cooling circuit The cooling circuit can be damaged if the cooling water freezes. If the ambient temperature falls below 0°C during operation, add anti-freeze to the cooling water.

Installation 5

5.1 Installation

CAUTION
Temperature-sensitive parts Some parts of the motor enclosure can reach temperatures that exceed 100°C. Temperature-sensitive components, e.g. cables etc., can be damaged if they come into direct contact with the motor enclosure. When locating temperature-sensitive components, ensure that they do not come into contact with the motor enclosure.

CAUTION
Shaft end When installing the motor, ensure that the end of the shaft is protected against blows and pressure.

Note

Observe the technical data on the motor enclosure rating plates.

The following must be taken into account when the motors are installed

- Observe the type of construction and degree of protection stamped on the rating plate and check that they comply with the conditions at the installation location.
- Refer to the configuration manual for the permissible radial and axial forces.
- Check that they match the conditions (temperature, installation altitude) at the installation location.
- Ensure that the end of the shaft is completely free of any anti-corrosion protection (use a commercially available solvent).
- Ensure that the flange or mounting foot has even contact with the mounting surface. No stress or strain is permissible.
- If the motor is installed vertically with the end of the shaft facing up, ensure that no liquid can enter into the upper bearing.
- Rotate the drive elements by hand. If you hear any grinding noise, rectify the cause or contact the manufacturer.
- Eyebolts that have been screwed in must either be tightened or removed after installation.
- Air-cooled motors must be installed in such a way that the cooling air can flow in and out without any obstruction and that the minimum distance s is maintained between the air

inlet and discharge openings and adjacent components (see "Minimum distance" diagram in "Cooling" section). It is not permissible that the hot air is drawn-in again.

NOTICE
The covers for air-cooled motors, which were removed to allow the motors to be secured, must be reattached before commissioning.

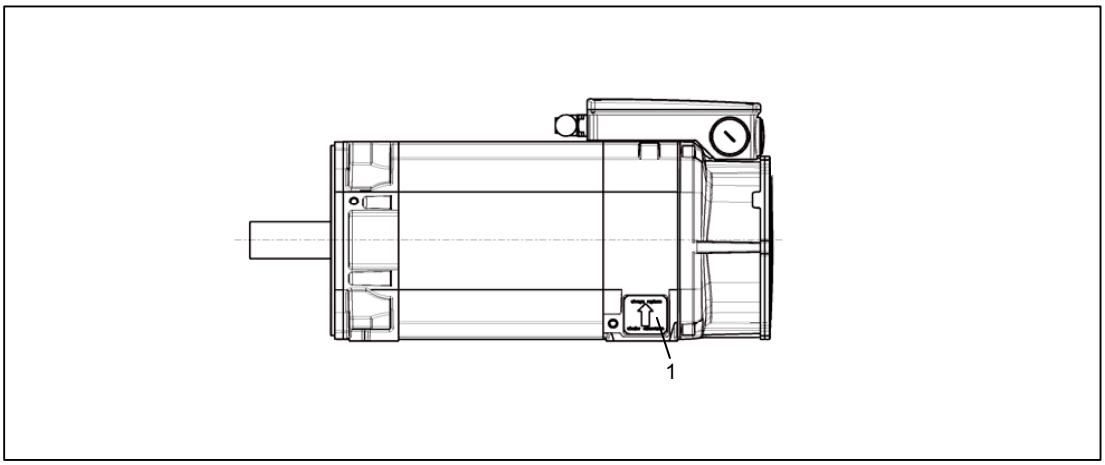


Figure 5-1 Cover for foot mounting (1) at NDE (example)

5.2 Fixing

To ensure smooth, vibration-free operation, the base must be designed in accordance with DIN 4024, the machine must be precisely aligned, and the components to be mounted on the end of the shaft must be properly balanced.

Securing the motor by means of motor feet (mounting foot)

The contact surfaces of the motor feet must lie on one plane. If the motor needs to be aligned, position metal shims underneath the feet in order to prevent machine deformation. The number of shims should be kept as low as possible i.e. stack as few as possible.

Securing the motor by means of a flange (flange mounting)

NOTICE
When the motor is mounted by means of a flange, this creates an oscillating system with specific natural installation frequencies, which can generate excessive vibration during operation. To counter this, additional support can be provided at the NDE. Ensure that the motor is not subject to excessive tension.

Tightening torques

Table 5- 1 Tightening torques for foot/flange mounting

Mounting type	Screw ISO 4017	Washer ISO 7092	Tightening torque ± 10% [Nm]
Mounting foot	M10	10 (d2 = 18)	42
Flange mounting	M16	12 (d2 = 28)	165
Use screws of property class 8.8 or higher.			

Alignment accuracy for coupling output

The maximum concentricity of the shafts of the motor and the driven machine is 0.05 mm in diameter.

5.3 Attaching the output elements

Balancing

The rotors are balanced dynamically. The motors are equipped with a smooth shaft as standard. For shaft ends with feather keys, the balancing method at the DE of the shaft is indicated as follows:

- "H" means **H**alfkey = balancing with a half feather key
- "F" means **F**ullkey = balancing with a whole feather key

Pushing on the output elements

- Make sure that the balancing method of the output element is correct! The output elements must be balanced to balance quality grade G2.5 to ISO 1940. Rotary forces that exceed this are not permissible.
- If the output element is shorter than the feather key with balancing method "H", the section of the feather key that protrudes from the shaft contour and output element must be removed to maintain the balance quality.
- Output elements must only be fitted/removed using suitable equipment.
  - Use a threaded hole in the shaft end (front).
  - If necessary, heat up the output element.
  - When removing output elements, use an intermediate washer to maintain the centering in the shaft end.

⚠WARNING

Shock-hazard protection for output elements

The general shock-hazard protection measures for output elements must be observed.

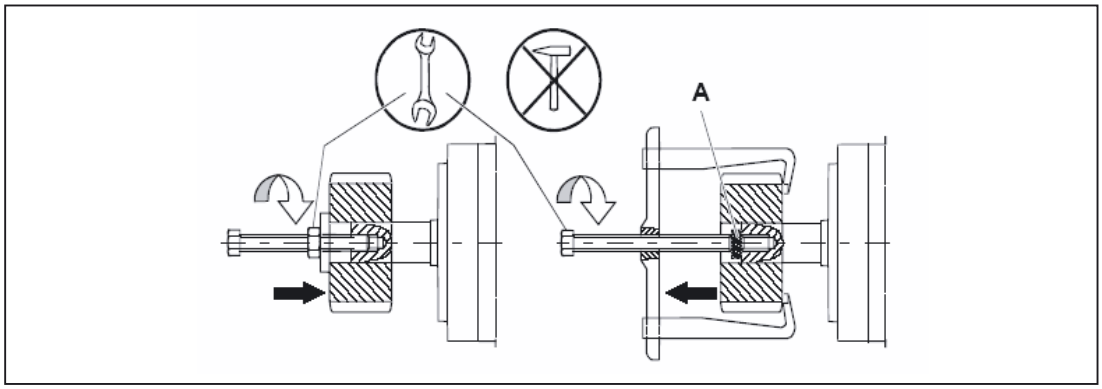


Figure 5-2 Fitting/removing output elements; A = intermediate washer (for maintaining the centering in the shaft end)

Motor without output element

⚠WARNING

The feather key can fall out

The featherkeys are only secured during transport to prevent them from falling out. If a motor is not equipped with an output element, the feather key may fall out during operation.

Death or serious injury can result.

At the shaft end, secure the fitted key without output element so that it cannot be flung out and for balance type "H" shorten it by approximately half.

5.4 Vibration strength

The on-site system vibration characteristics depend on factors such as the output elements, assembly conditions, alignment, installation, and external vibrations and can increase the level of vibration on the motor.

Under certain circumstances, the rotor may have to be balanced completely with the output element.

To ensure problem-free operation and a long service life, the vibration values specified to ISO 10816 must not be exceeded at the defined measuring points on the motor.

Table 5- 2 Max. permissible radial vibration values [1)]

Vibration frequency	Vibration values
< 6.3 Hz	Vibration displacement s ≤ 0.16 mm
6.3 - 250 Hz	Vibration velocity v_{eff} ≤ 4.5 mm/s
> 250 Hz	Vibration acceleration a ≤ 10 m/s2

Table 5- 3 Max. permissible axial vibration values [1)]

Vibration velocity	Vibration acceleration
v_{eff} = 4.5 mm/s	a_{peak} = 2.25 m/s^2

1) Both values must be observed simultaneously.

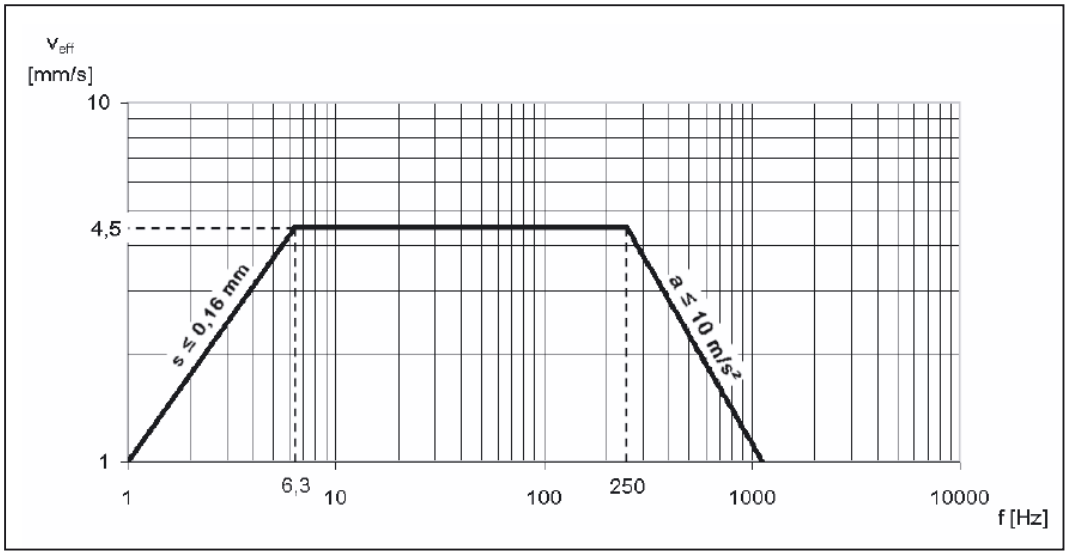


Figure 5-3 Max. permissible vibration velocity, taking into account the vibration displacement and vibration acceleration

To measure the vibration velocity, the measuring equipment must fulfill the requirements of ISO 2954. The vibration acceleration must be measured as a peak value in the time range in a frequency band of 10 to 2000 Hz.

If excitation in excess of 2000 Hz (e.g. meshing frequencies) can be expected, the measurement range must be adapted accordingly. This does not alter the maximum permissible values.

Connection

6

6.1 Mechanical connection of water cooling system

The inlet and outlet holes for the cooling water supply are located on the NDE in the bearing shield.

1. Make sure that the cooling water fulfills the required cooling water specification (see "Cooling water specification").
2. Make sure that the appropriate volume of cooling water is available (see the rating plate).
3. Screw the cooling water pipes into the 3/8" internal threads. You can connect the inlet and outlet as required.
4. Make sure that the maximum permissible operating pressure does not exceed 6 bar.

6.2 Electrical connection

6.2.1 Safety information

⚠ DANGER
Risk of electric shock All work performed on electrical components must be carried out when the motor is at a standstill. This also applies to auxiliary circuits (e.g. separately-driven fan). Converters and connectors must only be installed by properly trained personnel. Regulations regarding work carried out in electrical installations must be observed.

Safety regulations for work performed in electrical installations to EN 50110-1 (DIN VDE 0105-100):

- Work must only be carried out when the system has been disconnected from the power supply.
- Disconnect the system.
- Take suitable measures to ensure that it cannot be switched on again.
- Make sure that the equipment is de-energized.
- Establish the necessary ground and short-circuit connections.
- Cover or enclose adjacent components that are still live.
- Release for work.
- Connect the protective conductor.

⚠ DANGER
Risk of electric shock
The insulating film in the terminal box protects against voltage flashover to the cover and must not be removed.

CAUTION
Electrostatically-sensitive devices
The DRIVE-CLiQ interface contains electrostatically-sensitive components. Touching connections with electrostatically charged hands or tools can cause malfunctions.
Note the ESD protection measures.

6.2.2 Cable entry and routing

- When selecting the required connecting cables, make sure that you take into account the rated current and plant-specific conditions, such as ambient temperature, routing type, etc. according to IEC / EN 60364-5-52 and IEC / EN 60204-1.
- Use EMC cable glands for permanently installed cable entries.
- Use shielded cables whose shields are conductively connected to a large area of the terminal box of the motor via EMC cable glands.
- Arrange the exposed connecting cables in the terminal box so that the PE conductor has an excess length and the insulation of the cable conductors cannot be damaged.
- Only remove insulation from the cable ends so that the insulation reaches up to the cable lug, terminal, or wire end ferrule.
- Adapt the size of the cable lugs or wire end ferrules in line with the dimensions of the terminal board connections and the cross-section of the power cable (use parallel connection cables, if necessary).
- Make sure that the inside of the terminal box or connector is clean and free of cable cuttings and moisture.
- Tighten all of the screws for the electrical connections (terminal board connections, with the exception of the terminal strips) to the specified torque:

Table 6- 1 Tightening torques

Thread ∅	M4	M5	M6	M8	M10
Tightening torque [Nm]	0,8 ... 1,2	1,8 ... 2,5	2,7 ... 4	5,5 ... 8	9 ... 13

- When connecting or changing internal connection cables, always observe the minimum air clearance of 5.5 mm.
- Avoid protruding cable ends.
- Seal unused cable entries and screw in sealing elements so that they are secure and airtight.
- Check seals and sealing surfaces of the terminal box or connector to ensure that the degree of protection is maintained.
- Take measures to ensure that connecting cables cannot rotate, are not subject to strain and pushing force and also provide anti-kink protection. Connectors must not be subject to continuous force
- The coding slot for the plug-in connections must be aligned when inserted into the socket connector. The union nut must be tightened by hand up to the endstop.
- The insulating film must be present in the terminal box.
- Make sure that the cable shields are properly connected.

Current-carrying capacity for power and signal cables

The current-carrying capacity of PVC/PUR-insulated copper cables is specified for routing types B1, B2, and C under continuous operation conditions in the table with reference to an ambient air temperature of 40°C. For other ambient temperatures, the values must be corrected by the factors from the "Derating factors" table.

Table 6- 2 Cable cross-section and current-carrying capacity

Cross-section	Current-carrying capacity rms; AC 50/60 Hz or DC for routing type		
[mm²]	B1 [A]	B2 [A]	C [A]
Electronics (to EN 60204-1)			
0.20	-	4.3	4.4
0.50	-	7.5	7.5
0.75	-	9	9.5
Power (to EN 60204-1)			
1,50	13,5	13,1	15,2
2,50	18,3	17,4	21
4	24	23	28
6	31	30	36
10	44	40	50
16	59	54	66
25	77	70	84
35	96	86	104
50	117	103	125
70	149	130	160

Table 6- 3 Derating factors for power and signal cables

Ambient air temperature [°C]	Derating factor to EN 60204-1, table D1
30	1.15
35	1.08
40	1.00
45	0.91
50	0.82
55	0.71
60	0.58

6.2.3 Circuit diagram

The circuit diagram contains information about wiring and connecting the motor winding. The circuit diagram can be found on the lid of the terminal box.

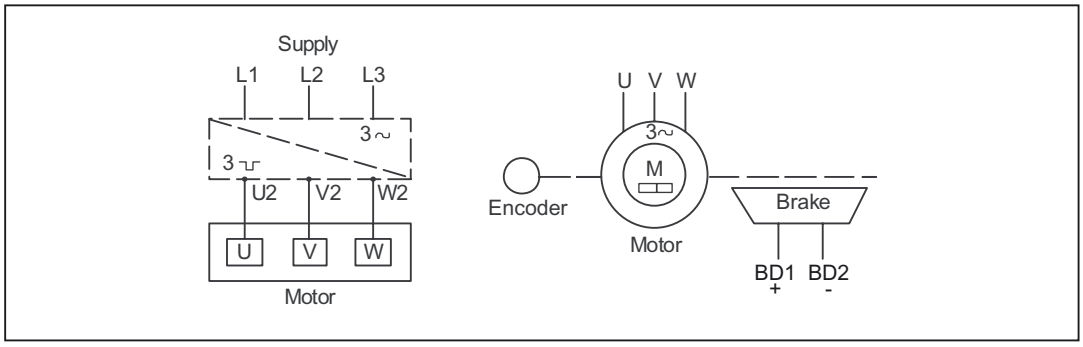
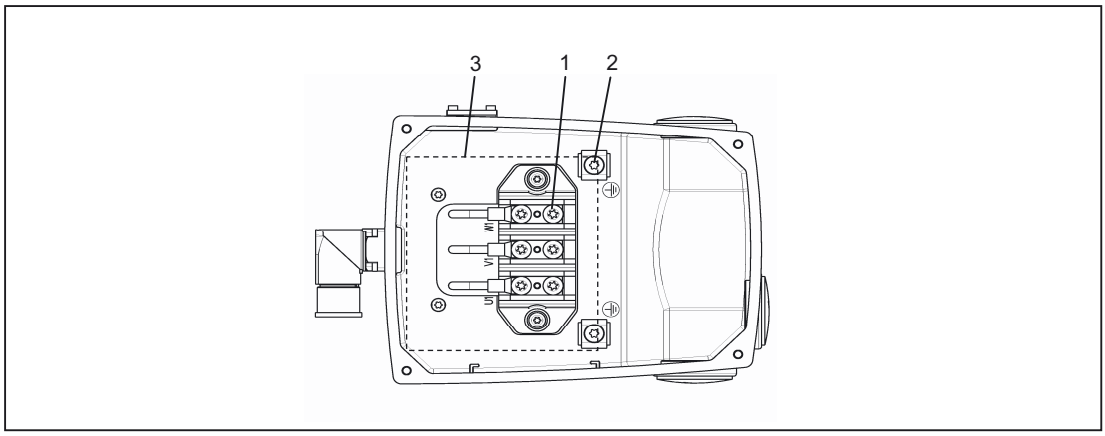


Figure 6-1 Circuit diagram

NOTICE
Cable outlet direction If the direction of the cable outlet is not changed correctly, this can damage the connecting cables. The direction of the cable outlet must not be changed since this renders all warranty claims invalid.

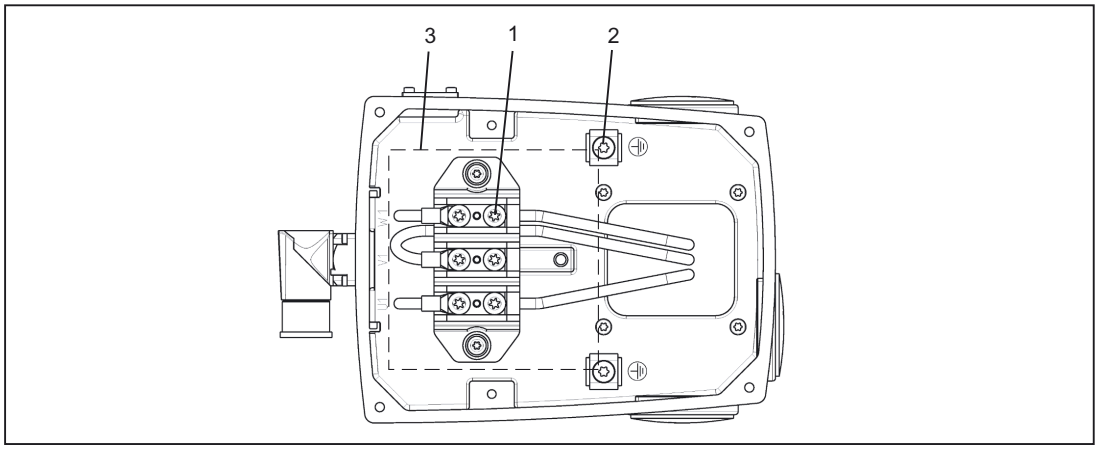
6.2.4 Terminal box

- Assign the terminals in the terminal box as shown in the diagrams "Terminal box: 3-pole" and "Terminal box: 6-pole".
- Connect the protective conductor.
- Use cable lugs to DIN 46234.
- Do not remove the insulation strips.
- Screw the lid of the terminal box back on (tightening torque: 5 Nm).



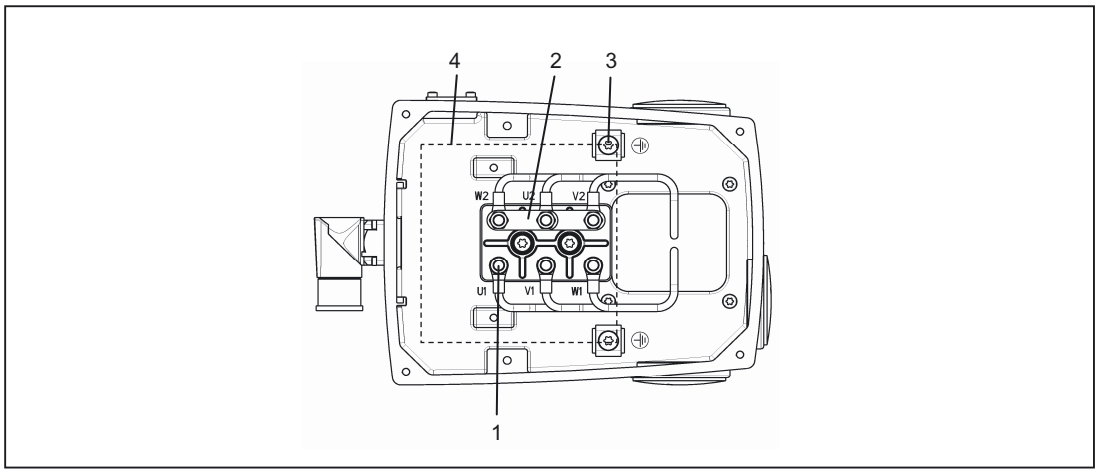
1 Terminal screw M6
2 Grounding screw M6
3 Insulation strips

Figure 6-2 Terminal box gk833, 3-pole



1 Terminal screw M6
2 Grounding screw M6
3 Insulation strips

Figure 6-3 Terminal box gk843



1 Terminal stud M6
2 Jumper
3 Grounding screw M6
4 Insulation strips

Figure 6-4 Terminal box gk846, 6-pole (can be switched between star and delta)

Star/delta connection

A star/delta connection is implemented by means of an external contactor circuit or as a fixed configuration in terminal box gk826.

Standard configuration: star connection via jumpers

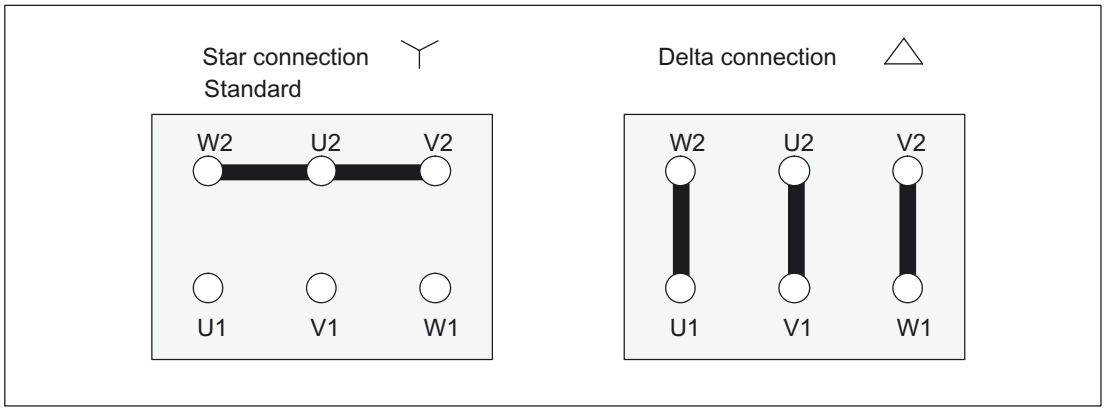


Figure 6-5 Fixed star/delta connection in the terminal box

6.2.5 Power connector

- Use connector size 3.
- Assign the connector as shown in the "Power connector" diagram. Connect the protective conductor.

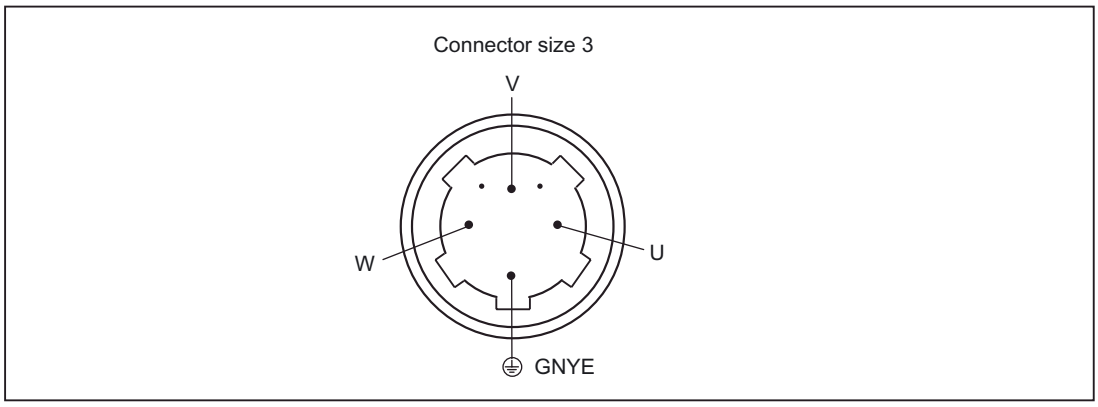


Figure 6-6 Power connector (view of connector pins)

6.2.6 Electrical connection data

Table 6- 4 1PH8 motors, shaft height 132

Terminal box type	Cable entry (power)	Cable entry (external signals)	Max. external cable diameter [2]	Number of main terminals	Max. cross-section per terminal	Max. current per terminal [3]
gk833	1 x M40 x 1.5	1 x ∅ 22 mm [1]	32 mm	Phases: 3 x M6 Grounding 2 x M6	1 x 35 mm^2	104 A
gk843	1 x M50 x 1.5	1 x ∅ 22 mm [1]	38 mm	Phases: 3 x M6 Grounding 2 x M6	1 x 50 mm^2	125 A
gk846	1 x M50 x 1.5	1 x ∅ 22 mm [1]	38 mm	Phases: 6 x M6 Grounding 2 x M6	1 x 25 mm^2	84 A

[1] Nole with ∅ 22 mm, 90° to signal connection

[2] Depending on design of metric cable gland

[3] Current-carrying capacity based on EN 60204-1 and IEC 60364-5-52, routing type C

6.2.7 Motors with DRIVE-CLiQ interface

Motors designed for SINAMICS drive systems are equipped with an internal Sensor Module, which contains an encoder and temperature evaluation system as well as an electronic rating plate. The Sensor Module is mounted instead of the signal connector and is equipped with a 10-pin RJ45plus socket. This is known as a DRIVE-CLiQ interface. The pin assignment is independent of the motor-internal encoder. The Sensor Module can be rotated through approx. 180°. The typical torsional torque is between 4 and 8 Nm. The Sensor Module must only be rotated by hand. The use of pipe wrenches, hammers etc. is not permitted.

NOTICE

The Sensor Module is in direct contact with electrostatically-sensitive components. It is not permissible to touch the connections with either hands or tools that could be electrostatically charged.

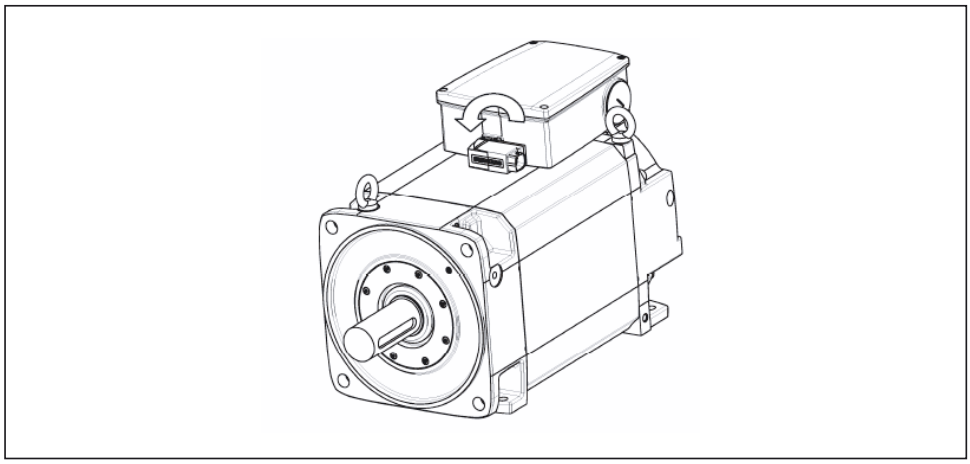


Figure 6-7 Motor with DRIVE-CLiQ interface (example)

The signal connection between the motor and Motor Module is established by means of a MOTION-CONNECT DRIVE-CLiQ cable. The MOTION-CONNECT DRIVE-CLiQ cable connector must be inserted far enough so that the catch springs engage.

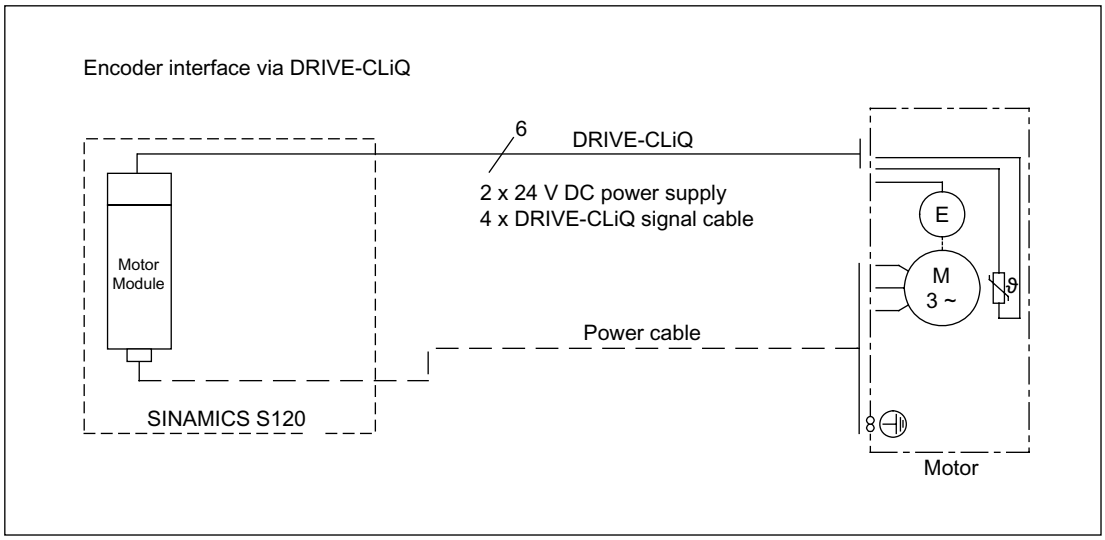


Figure 6-8 Encoder interface with DRIVE-CLiQ

6.2.8 Motors without DRIVE-CLiQ interface

If a motor is not equipped with a DRIVE-CLiQ interface, the speed encoder and temperature sensor are connected via a signal connector.

Motors that are not equipped with DRIVE-CLiQ require a Cabinet-Mounted Sensor Module when operated with SINAMICS S120. The motor is connected to the Cabinet-Mounted Sensor Module via the signal cable. The Cabinet-Mounted Sensor Module is connected to the Motor Module via a MOTION-CONNECT DRIVE-CLiQ cable.

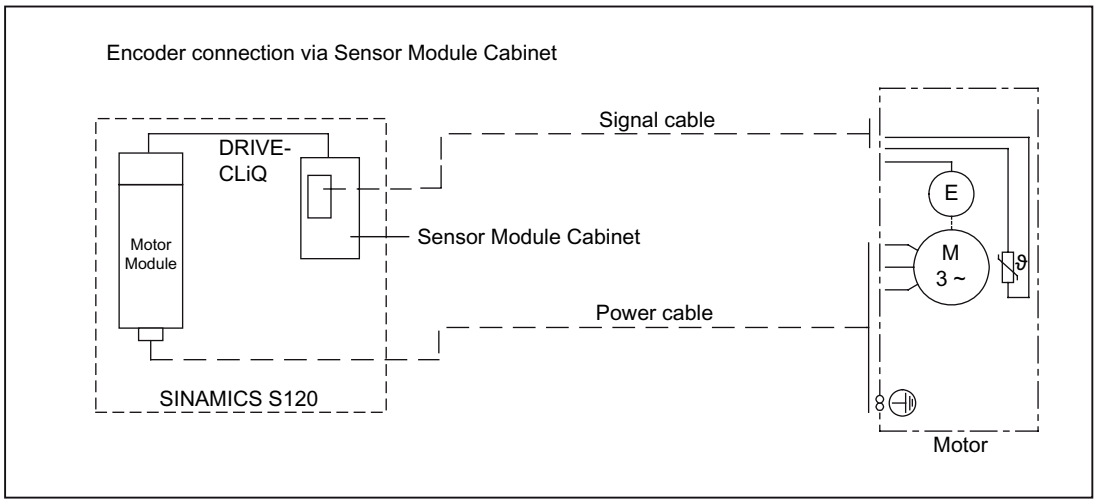


Figure 6-9 Encoder interface without DRIVE-CLiQ

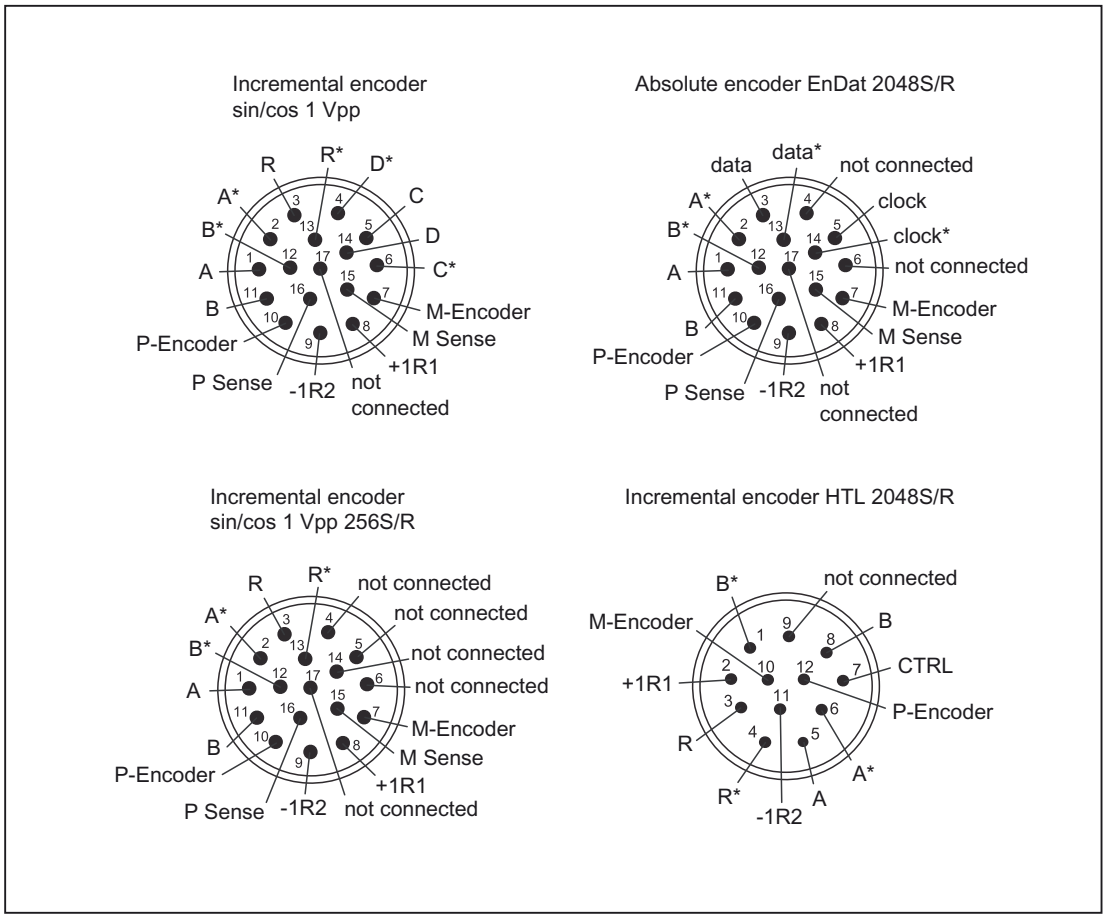


Figure 6-10 Signal connection (view of connector pins)

A suitable socket connector can be used to rotate the angle plug. Make sure that the socket connector is completely secure to avoid damaging the pin contacts.

6.2.9 Connecting the temperature sensor

The temperature sensor is connected to the signal connector together with the speed encoder signal.

6.2.10 Connecting the ground conductor

The motor grounding conductor cross-section must be in full compliance with the installation regulation, e.g. according to IEC / EN 60204-1. The grounding conductor is connected in the terminal box.

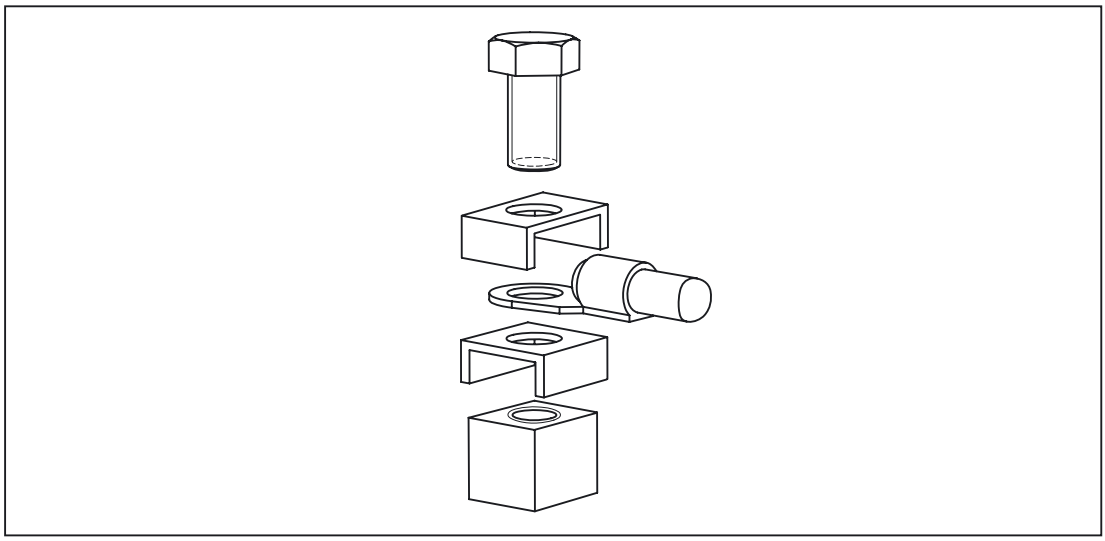


Figure 6-11 Connecting the grounding conductor

Equipotential bonding

The internal equipotential bonding between the grounding terminal in the terminal box enclosure and the motor enclosure is established through the terminal box retaining bolts. The contact locations underneath the bolt heads are bare metal and protected against corrosion.

The standard cover fixing screws are sufficient for equipotential bonding between the terminal box cover and terminal box enclosure.

6.2.11 Connecting the separately-driven fan

The fan connection is located in the fan terminal box.

Table 6- 5 Connection specifications for separately-driven fans (1PH813x)

Air flow direction	Max. current consumption at:	
	400 V / 50 Hz (±10 %)	480 V / 60 Hz (+5 %/-10 %)
DE → NDE	0.46 A	0.53 A
NDE → DE	0.30 A	0.35 A

Note the following information regarding connections:

- Only use cables that comply with the relevant installation regulations regarding voltage, current, insulation material, and load-carrying capacity.
- Before connecting the device, make sure that the line voltage matches the device voltage.
- Check whether the data on the fan rating plate matches the connection data.
- Open the terminal box and route the cables (not supplied) into the terminal box.
- Connection cables must not be subject to excessive tensile stress.
- Connect the protective conductor (PE).
- Connect the other cables to the relevant terminals (refer to the connection diagrams).

NOTICE

To protect the device against moisture, make sure that you use suitable cables at the connection cable gland on the terminal box and that the lid for the terminal box is properly fitted. Water must not be allowed to run along the cables and into the terminal box.

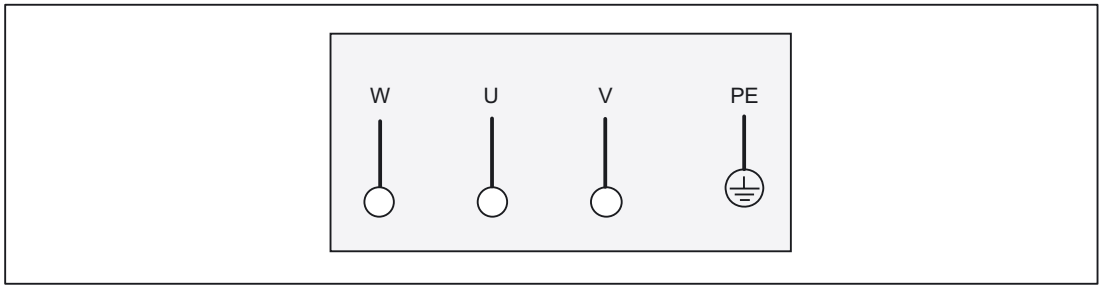


Figure 6-12 Connection for the separately-driven fan in the terminal box

Note

If you order the motor with a power connector, the separately-driven fan is connected with a size 1 power connector.

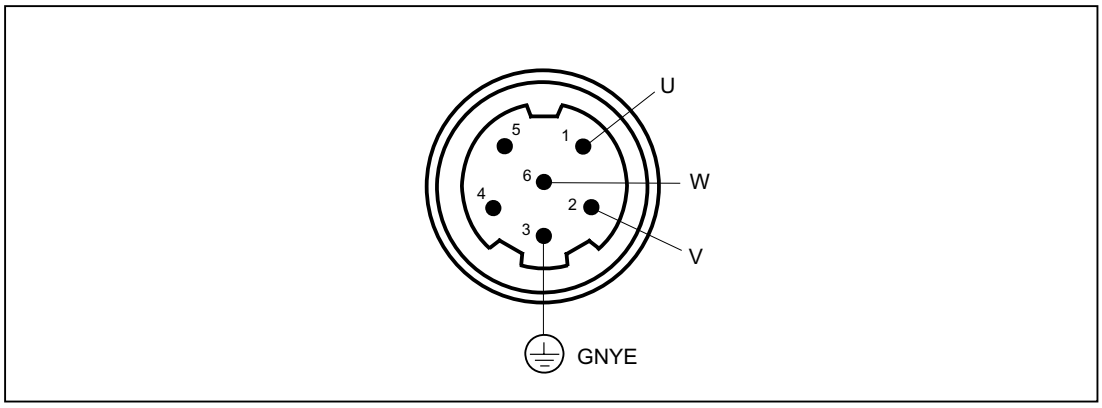


Figure 6-13 Connecting the separately-driven fan by means of the connector

⚠CAUTION

To protect the fan against improper use (block protection), a suitable motor circuit breaker that supports all-pole disconnection must be installed. The fan must be operated via this motor circuit breaker.

A protective circuit must be implemented that prevents the main machine from being activated when the fan unit is not in operation.

6.2.12 Connecting-up a converter

Selecting and connecting the cable

To connect the motor to a converter, use Motion-Connect cables or shielded connection cables. The cable shielding, made up of as many strands as possible, must have a high electrical conductivity. Braided shields made of copper or aluminum are well suited.

The shield must be connected at both ends to the motor and the converter; unshielded cable ends must be kept as short as possible.

To ensure that high-frequency currents are effectively discharged, establish the shield connection through the largest possible area, as 360° contact at the converter and at the motor, e.g. using EMC glands at the cable entry points.

6.2.13 Converter operation on a grounded line supply

Parallel protective conductor

In the case of current-limited converters without ground fault monitoring, protective conductor currents of up to 1.7 times the phase current can flow if there is a ground fault at the output.

Neither the protective conductors of normally dimensioned multi-core connecting cables nor the protective conductor connecting points of normal terminal boxes are suitable for this purpose.

- Route an appropriately dimensioned protective conductor in parallel.
- Connect the parallel protective conductor to the grounding terminal on the motor enclosure.

Commissioning

7

7.1 Measures prior to commissioning

Before commissioning the system, check that it is properly installed and connected. The drive system must be commissioned as described in the operating instructions for the converter/inverter.

Note

This list below does not claim to be complete. It may be necessary to perform additional checks and tests in accordance with the specific, on-site situation.

⚠ CAUTION

Thermal hazard: hot surfaces

The surface temperature of the motors can exceed 100°C.

Do not touch hot surfaces.

If necessary, implement shock-hazard protection measures.

Temperature-sensitive parts (electric cables, electronic components) must not be placed on hot surfaces.

Mechanical connection

- All touch protection measures for moving and live parts have been taken.
- The motor has been assembled and aligned properly.
- The rotor can spin unhindered.
- The operating conditions correspond to the data specified on the rating plate.
- All fixing screws, connecting elements, and electrical connections must be tightened and properly implemented.
- The output elements have the proper setting conditions according to type, for example.
  - Couplings are aligned and balanced.
  - The belt tension is properly adjusted if a belt drive is used.
  - Gear tooth flank play and gear tooth tip play as well as radial play are properly adjusted if a gearwheel drive is used.

Electrical connection

- The motor is connected so that it rotates in the direction specified.
- The minimum insulation resistance values are maintained.
- The grounding and equipotential bonding connections have been established correctly.
- All brakes are operating correctly.
- The indicated speed limit n_{max} is not exceeded during operation on a converter.

⚠ CAUTION
If the speed n_{max} is exceeded, this can damage the bearings, short-circuiting rings, press fits, etc. To ensure that the motor does not run at excessive speeds, the controller must configured accordingly or speed monitoring must be activated in the drive system.

Monitoring equipment

- Appropriately configured control and speed monitoring functions ensure that the motor cannot exceed the permissible speeds specified on the rating plate.
- Any supplementary motor monitoring devices and equipment have been correctly connected and are fully functional.

Cooling

Water cooling

If water cooling is used, the cooling water supply must be connected and ready for operation. The cooling water circulation (flow rate, temperature) complies with requirements.

Forced ventilation

All safety and functional issues must be checked prior to commissioning. A checklist, which does not claim to be exhaustive, is provided below to help you in this regard.

Forced ventilation: the fan functions properly and rotates in the right direction.

Compare the data for the forced ventilation unit with the connection data. The forced ventilation unit must not be connected if the connection data differs from the data for the forced ventilation unit in any way that would result in overload.

Check the electrical installation (e.g. protective conductor fitting) of the forced ventilation unit (including accessories).

Check the installation and electrical installation of safety-relevant components, such as motor circuit breakers, guards, and so on.

Make sure that the PG glands are properly sealed.

Remove any parts located in the discharge area of the fan or in the vicinity of the fan blade.

An arrow on the fan rating plate indicates the correct direction of rotation of the fan. An arrow is also marked on the fan blades. You can check the direction of rotation visually when the fan starts up. This must be the same as the direction of the arrow on the fan rating plate.

Brake (optional)

- If a brake is fitted, this is released when the operating voltage is applied.
- The brake functions (releases/engages) properly.

Rolling-contact bearings

If the motor was stored for more than three years under favorable conditions (i.e. in a dry, dust-free room that is not susceptible to vibration), the bearings must be replaced.

NOTICE
Unfavorable conditions If the motor was stored under unfavorable conditions, the bearings need to be replaced after approx. 18 months.

7.2 Performing a trial run

⚠ WARNING
Water cooling: risk of burning from hot steam If the cooling water supply fails, the motor will overheat. If cooling water runs into the hot motor, hot steam suddenly forms, which escapes under high pressure. The cooling water system can burst. This can result in death, serious injury, or material damage. Do not connect the cooling water supply until the motor has cooled down.

⚠ WARNING
With forced ventilation: risk of suction There is a risk of suction at the air inlet (e.g. hair, ties, loose objects, etc.). Suitable protection measures must be implemented by the operator (remove ties, wear hair nets, keep suction area free, etc.).

⚠ WARNING
Danger from rotating rotor Implement shock-hazard protection measures for output elements. Take suitable measures to ensure that feather keys (if used) cannot fall out.

NOTICE
Holding brake The brake can only be used in certain cases (power failure, EMERGENCY OFF). The brake must not be used as an operating brake. When the motor is shut down, the brake operates as a holding brake.

7.3 Checking the insulation resistance

After long storage or shutdown periods, the insulation resistance of the windings must be measured to ground with direct voltage.

⚠ WARNING
Work on power installations must only be carried out by specialists. Before measuring the insulation resistance, read the manual for the insulation resistance meter you are going to use.

⚠ WARNING
Danger! High voltage During and immediately after the measurement, hazardous voltage levels may be present. Touching live components can be result in death or serious injury. Never touch the terminals when measuring or immediately after the measurement. Check the connected supply feeder cables to ensure that the line supply voltage cannot be connected.

- Always measure the insulation resistance of the winding to the motor enclosure when the winding temperature is between 20 and 30°C.
- When performing the measurement, wait until the final resistance value is reached (this takes approx. one minute).

Limits

The table below specifies the measuring circuit voltage as well as the limit values for the minimum insulation resistance and the critical insulation resistance with a rated motor voltage of U_N < 2 kV:

Table 7- 1 Stator winding insulation resistance at 25 °C

	Rated voltage U_N < 2 kV
Measurement voltage	500 V (at least 100 V)
Minimum insulation resistance with new, cleaned, or repaired windings	10 MΩ
Critical specific insulation resistance after a long operating time	5 MΩ/kV

Note the following:

- Dry, new windings have an insulation resistance of between 100 and 2000 MΩ (sometimes higher).

  If the insulation resistance is close to the minimum value, this could be due to humidity and/or an accumulation of dirt.

- The insulation resistance of the motor winding can drop during the course of its service life can drop due to ambient and operational influences. The critical insulation resistance for a temperature of 25°C on the winding can be calculated by multiplying the rated voltage (kV) by the specific critical resistance value (5 MΩ/kV);

  Example: Critical resistance for a rated voltage (U_N) of 500 V:

  500 V x 5 MΩ/kV = 2.5 MΩ

NOTICE

Cleaning and/or drying the windings when reaching critical insulation resistance

If the critical insulation resistance is less than or equal to this value, the windings must be dried or, if the fan is removed, cleaned thoroughly and dried.

Note that the insulation resistance of dried, clean windings is lower than that of warm windings. The insulation resistance can only be evaluated accurately when measured on a winding that has been cooled down to room temperature (approx. 20 to 30°C).

NOTICE

Measured value close to critical value

If the measured value is close to the critical value, the insulation resistance should be subsequently checked at suitably regular intervals.

Values apply for measurement at a winding temperature of 25 °C.

7.4 Switching on the motor

Before switching on the motor, make sure that the frequency converter parameters have been correctly assigned.

Use appropriate commissioning tools (e.g. "Drive ES" or "STARTER").

CAUTION

Operation noise or abnormal noises

The motor can be damaged by improper handling during transport, storage, or setup. If a damaged motor is operated, this can damage the winding or bearings and could even destroy the system.

If the motor is not running smoothly or is emitting abnormal noises, shut the motor down and try to determine the cause of the fault as it runs down.

⚠ CAUTION

Note the maximum rotational speed

The maximum rotational speed n_{max} is the highest permissible operating speed. The maximum speed is specified on the rating plate.

If the speed n_{max} is exceeded, this can damage the bearings, short-circuiting rings, press fits, etc. To ensure that the motor does not run at excessive speeds, the controller must configured accordingly or speed monitoring must be activated in the drive system.

7.5 Cooling

Water cooling

The motor must always be connected to the cooling water supply when in operation.

CAUTION
If the cooling water supply fails or the motor is operated for a short time without cooling water, this can cause it to overheat. This can result in material damage or destroy the motor completely. Never operate the motor without the cooling water supply. Monitor the permissible water inlet temperatures.

⚠ WARNING
Risk of burning from hot steam When cooling water enters the hot motor, this immediately generates hot steam that escapes under high pressure. The cooling water system can burst. This can result in death, serious injury or material damage. Do not connect the cooling water supply until the motor has cooled down.

Forced ventilation

Steps must be taken to ensure that the motor is only operated in conjunction with the separately-driven fan.

CAUTION
If the separately-driven fan fails or the motor is operated for a short time without forced ventilation, this can cause it to overheat. This can result in material damage or destroy the motor completely. Always operate the motor with the separately-driven fan switched on.

Operation

8

8.1 Safety instructions during operation

⚠ WARNING

Do not remove covers when motor is running

Rotating or live parts are dangerous. Death, serious injury, or material damage can result if the required covers are removed.

All covers that prevent operators from coming into contact with active or rotating parts, ensure compliance with the required degree of protection, or ensure proper air guidance and, in turn, effective cooling must not be opened/removed during operation.

⚠ WARNING

Faults during operation

Deviations from normal operation (e.g. increased power consumption, temperatures or vibrations, unusual noises or odors, tripping of monitoring devices, etc.) indicate that the machine is not functioning properly. This can cause faults that can result in eventual or immediate death, serious injury, or material damage.

Inform maintenance personnel immediately. If in doubt, shut down the motor immediately, taking into account the plant-specific safety regulations.

⚠ CAUTION

Danger of burns

The temperature of certain parts of the motor can exceed 100°C. Physical contact with the machine could cause serious burns.

Check the temperature of the parts before touching them and take appropriate protective measures if necessary.

8.2 Stoppages

Measures for operational motors during stoppages

- If the motor is out of service for extended periods of time, run it at regular intervals (roughly once a month) or at least spin the rotor.
- Refer to the section "Energizing" before restarting the motor.

NOTICE
Damage due to improper storage The motor can be damaged if it is not stored properly. If the motor is out of service for extended periods of time, implement suitable anti-corrosion, preservation, and drying measures. When restarting the motor after a long shutdown period, carry out the measures recommended in "Commissioning".

8.3 Shutdown

Measures during shutdown

- When shutting the motor down, refer to the operating instructions for the frequency converter.
- Switch off the cooling water supply if the standstill period is expected to be lengthy.

8.4 Faults

Note

Damage to the machine caused by faults

Correct the cause of the fault as specified in the remedial measures section. Repair any damage to the machine/motor.

Note

When operating the motor with a converter, refer also to the operating instructions of the frequency converter if electrical faults occur.

Table 8- 1 Possible faults

Fault	Cause of fault (see key table)																	
Motor does not start up	A	B			E													
Motor starts up slowly	A		C		E	F												
Rumbling noise during startup			C		E	F												
Rumbling noise during operation	A		C		E	F												
Overheating during no-load operation				D			G	H	I									
Overheating with load	A		C				G	H	I									
Overheating of individual winding sections					E	F												
Uneven running										J	K							
Grinding sound, running noise												L						
Radial vibrations													M	N	O	P	R	
Axial vibrations															O		Q	R	
Water is escaping																		S

Table 8- 2 Key to causes of faults and remedial measures

No.	Cause of fault	Remedial measures
A	Overload	Reduce load
B	Interruption of a phase in the supply cable	Check frequency converter and supply cables
C	Interruption of a phase in the supply after switching on	Check frequency converter and supply cables
D	Converter output voltage too high, frequency too low	Check the settings on the frequency converter, perform automatic motor identification
E	Stator winding incorrectly connected	Check winding connections
F	Winding short circuit or phase short circuit in stator winding	Measure the winding resistances and insulation resistances, repair after consultation with manufacturer
G	Cooling water not connected / switched off	Check cooling water connection / switch on cooling water
	Water connection / pipes defective	Locate leaks and seal as necessary, or consult the manufacturer
H	Cooling water flow rate too low	Increase cooling water flow rate
	Inlet temperature too high	Set correct inlet temperature
I	Heat dissipation impeded by deposits	Clean the surface of the drives and ensure that the cooling air can flow in and out unimpeded
	Cooling air inlet/outlet is blocked by foreign bodies	Remove the block and ensure that the cooling air can flow in and out unimpeded
	Fan motor does not start up	Make sure that the fan motor works properly
J	Insufficient shielding for motor and/or encoder cable	Check the shielding and grounding
K	Excessive drive controller gain	Adjust the controller
L	Rotating parts are grinding	Determine cause and adjust parts
	Foreign bodies within the motor	Send to manufacturer for repair
	Bearing damage	Send to manufacturer for repair
M	Rotor not balanced	Decouple rotor and rebalance
N	Rotor out of true, shaft bent	Consult the manufacturer
O	Poor alignment	Align motor unit, check coupling
P	Coupled machine not balanced	Re-balance coupled motor
Q	Shocks from coupled machine	Check coupled motor
R	Imbalance originating from gearing	Adjust/repair gearing
S	Cooling water pipe / water connection defective	Locate leaks and seal as necessary, or consult the manufacturer

Maintenance 9

9.1 Inspection and maintenance

9.1.1 Safety information

If you are unclear about anything, consult the manufacturer, specifying the motor type and serial number, or arrange for the maintenance work to be carried out by one of the Siemens Service Centers.

⚠DANGER

Risk of electric shock from touching live parts

Live electrical parts are dangerous. Touching these parts will result in an electric shock,

which in turn causes death or serious injury.

Before starting work on the machines, make sure that the plant or system has been disconnected in a manner that is compliant with the appropriate specifications and regulations. In addition to the main currents, make sure that supplementary and auxiliary circuits, particularly in heating devices, are also disconnected.

Note all the information provided in "Safety information and application information" in these operating instructions and ensure that only persons who have the necessary know-how are entrusted to carry out work on power installations.

⚠WARNING

Danger of burns

Some parts of the frame of electrical machines can reach temperatures in excess of 100°C.

Touching components when the machine is in operation can cause severe burns.

Do not touch frame parts while the machine is in operation or immediately after machine operation. Allow frame parts to cool off before starting any work.

Safety regulations

Before starting maintenance work, always observe the five safety rules.

1. Disconnect the system.
2. Protect against reconnection.
3. Make sure that the equipment is de-energized.
4. Ground and short-circuit.
5. Cover or enclose adjacent components that are still live.

Other safety-related measures

CAUTION
Personal protective equipment when using chemical cleaning agents Chemical cleaning agents can be caustic or emit dangerous fumes. If these come into contact with skin or if you inhale the fumes, this can cause injuries (e.g. chemical burns on the skin or respiratory passages, or skin irritation). During cleaning, make sure that appropriate methods of extracting fumes are in place and that you wear the appropriate protective gear (e.g. gloves, goggles, face masks). If using chemical cleaning agents, observe the instructions and any warnings provided in the relevant safety data sheet. Chemical cleaning agents must be suitable for use with the machine's components, particularly where plastic components are concerned.

⚠ CAUTION
Personal protective measures when working with compressed air When you clean using compressed air, this can stir up dust, metal chips, or cleaning agents, which can cause injury. When cleaning using compressed air, make sure you use suitable extraction equipment and wear protective equipment (safety goggles, protective suit, etc.).

9.1.2 Maintenance intervals

General

Careful and regular maintenance, inspections, and overhauls are essential for detecting and eliminating faults in good time before they can cause any damage.

NOTICE
Inspection if there are faults or unusual conditions Unusual conditions or faults that place undue electrical or mechanical stress on the three-phase motor (e.g. overload, short-circuit) can cause consequential damage to the machine. If faults or any unusual conditions occur (e.g overload or short-circuit), the machine must be inspected immediately.

Measures, inspection/maintenance intervals

Operating conditions and characteristics can vary widely. For this reason, only general maintenance intervals can be specified here.

- Maintenance intervals should, therefore, be scheduled to suit the local conditions (fouling, switching frequency, load, etc.).
- Perform the following measures after the operation time or the interval specified in the following table elapses.

Table 9- 1 Measures after operating times or intervals

Measures	Operating tines and intervals
Initial inspection	After 500 operating hours, after 6 months at the latest
General inspection Without radial shaft sealing rings With radial shaft sealing rings	 Approx. every 8000 operating hours, after 2 years at the latest Approx. every 5000 operating hours, after 2 years at the latest
Replace the bearings	Note the recommended bearing replacement intervals (see "Bearing replacement intervals")
Replace the radial shaft sealing rings	Approximately every 5000 operating hours
Clean the fan (forced ventilation)	Depending on local degree of pollution
Cooling water system (water cooling)	Maintenance free (provided that the required cooling water quality is ensured)

9.1.3 General inspection guidelines

When inspecting a motor, you do not generally need to dismantle it. The motor only be dismantled if the bearings need to be replaced.

9.1.4 Initial inspection

An initial inspection is performed once the motor has been installed or following repairs.

While the motor is running, check that:

- the equipment conforms to the stated electrical characteristics.
- the smooth running characteristics and motor noise during operation have not deteriorated.

Correct any deviations that are determined in the inspection without delay.

NOTICE
Adapt the inspection in line with plant-specific conditions This list does not claim to be exhaustive. Further tests also should be carried out in accordance with the additional instruction manuals (e.g. bearings, cooler, etc.) or in accordance with the particular system-specific conditions.

9.1.5 General inspection

While the motor is running, check that:

- The stated electrical characteristics are being observed
- The smooth running characteristics and machine running noise have not deteriorated

Once the machine has been shut down, check that:

- The motor foundation has no indentations or cracks
- The machine is aligned within the permissible tolerance ranges
- All the fixing bolts/screws for the mechanical and electrical connections have been securely tightened
- The winding insulation resistances are sufficiently high
- Any bearing insulation is fitted as shown on the plates and labels.
- Cables and insulating parts are in good condition and do not exhibit any signs of discoloration

CAUTION
If you identify any problems during the inspection, rectify them immediately otherwise the machine may be damaged.

9.1.6 Rolling-contact bearings

The permissible radial forces (transverse forces) are listed in the catalog or configuration manual.

9.1.7 Bearing replacement intervals

The bearings are subject to wear and must be replaced after a defined number of operating hours. The recommended bearing replacement intervals t_{LW} are listed in the following table.

The lifetime can be extended if the motor is operated under favorable conditions (e.g. low or medium speeds, low radial forces (transverse forces), vibration load).

NOTICE

Harsh operating conditions

If the motor is subject to harsh operating conditions (e.g. continuous operation at n_{max}, high vibration/shock loads, frequent reversing duty etc.), the bearing replacement intervals t_{LW} can decrease by up to 50%.

Table 9- 2 Recommended bearing change interval t_{LW}

Motor type	Bearing version							
	Standard		Advanced lifetime		Performance		High performance	
	n_m [1/min]	n_{max} [1/min]	n_m [1/min]	n_{max} [1/min]	n_m [1/min]	n_{max} [1/min]	n_m [1/min]	n_{max} [1/min]
1PH813□	< 6500	8000	< 2500	4500	< 8500	10000	< 10000	15000
t_{LW} [h]	20000	12000	40000	30000	12000	8000	12000	8000

$$n_m = \frac{n_1 t_1 + n_2 t_2 + \ldots n_i t_i}{100}$$

1PH8 motors require special bearings, which can be obtained via the Siemens Service Center.

9.1.8 Cleaning the fan (forced ventilation)

The fan in the forced ventilation unit is maintenance free due to the use of special bearing grease. If the fan blades need to be cleaned, however, the following must be taken into account:

⚠ DANGER

Danger of shearing

When carrying out maintenance work on the forced ventilation unit (e.g. cleaning the fan blades), make sure that the fan is at a standstill, the power for the forced ventilation unit is shut down, and that steps have been taken to ensure that it cannot be switched on again during the course of maintenance work.

⚠ CAUTION

Avoid the effects of excessive force

If excessive forces are present, this can damage the fan blades.

Note

The fan should be cleaned with a suitable cloth or brush, and steps should be taken to prevent moisture from entering the motor.

- Once the voltage has been disconnected on all poles, wait for five minutes before touching the device.
- Never open the device during operation.
- Never loosen any fixing screws for the ventilation unit during operation.
- To clean the fan, remove the guard from the ventilation unit. The motor does not need to be separated from the guard.
- Once you have finished cleaning the device, screw the guard (with fan) back on to the ventilation unit. When doing so, tighten the four screws to a torque of 4 Nm.

9.2 Repair

9.2.1 Safety information

Qualified personnel

This machine must be commissioned and operated by qualified personnel only. For the purpose of the safety information in these Operating Instructions, a "qualified person" is someone who is authorized to energize, ground, and tag equipment, systems, and circuits in accordance with established safety procedures.

Safety notes

⚠ WARNING

Rotating or live parts

Rotating or live parts are dangerous. Death, serious injury, or material damage can result if the required covers are removed or if the device is not operated properly.

Before starting work on the motor and, in particular, before opening the covers of live parts, make sure that the motor or system is properly isolated.

⚠ WARNING

Transportation in accordance with proper procedures

Only transport the motor in accordance with the transport guidelines. Death, serious injury, or material damage can result if the motor is not transported properly.

Whenever you have to transport the motor, follow the instructions provided in the section "Transport and storage".

9.2.2 Removing/installing the motor

Removal

- When removing the motor, mark the original position of the components with respect to each other (e.g. using a colored pen, scribing iron) to make subsequent installation easier.
- For information on how to remove the encoder, see "Removing the speed encoder".
- Unscrew the NDE bearing shield screws and carefully remove the NDE bearing shield.
- Unscrew the bearing cap screws (see "Spare parts", item 1.02).
- Remove the grease slingers from the shaft shoulder (DE).
- Remove the rotors from the motor. Use a suitable device to remove the rolling-contact bearings.

Installation

- Do not reuse rolling-contact bearings that have been removed.
- Heat up the new rolling-contact bearings evenly to 80 - 100°C and attach them. When doing so, make sure that the bearing inner ring lies on the shaft shoulder.
- The device must not be subject to hard knocks (e.g. do not use a hammer etc.).
- Insert the motor rotor into the stator.
- Secure the bearing cap.
- Insert the NDE bearing (with shaft spring) into the NDE flange (keep the bearing straight) and tighten the screws.

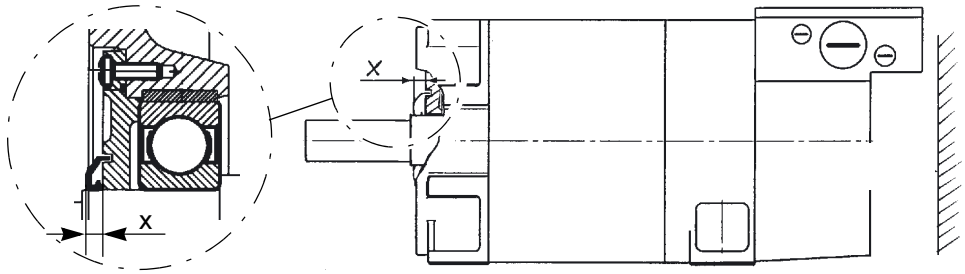


Figure 9-1 Installing the gamma ring

- Press on the grease slinger (gamma ring housing 9RB... without sealing lip) with a suitable sleeve (dimension x = 0 mm (flush with cover)). Do not use any grease slingers that were damaged when removed.

Running in the bearings

Once you have replaced the bearings, allow the rolling-contact bearings to run in to distribute the grease evenly. When doing so, the motors should be initially run continuously from 0 to approx. 75% of the maximum speed n_{max} over a period of 15 minutes.

9.2.3 Removing/installing the external fan

CAUTION

Electrostatically sensitive devices

Electronic modules contain components that can be destroyed by electrostatic discharge. These modules can be easily destroyed if they are not handled properly.

To protect your equipment against damage, follow the instructions given in the chapter ESD Guidelines.

⚠ CAUTION

Qualified and trained personnel

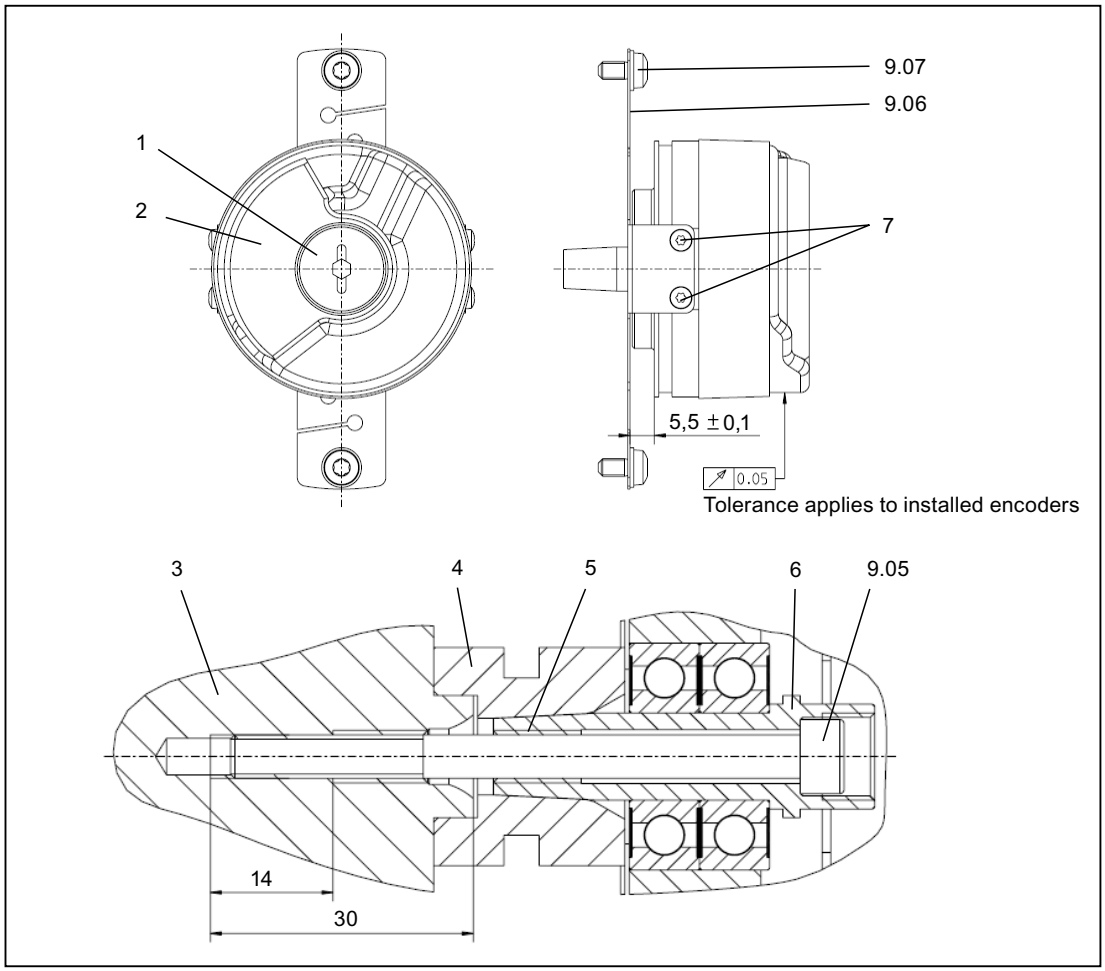
Only qualified, trained personnel may replace and adjust an encoder.

Note

Removing/installing the encoder

Unscrew the lid of the terminal box and disconnect the power and temperature sensor cables from the terminal box.

Unscrew the separately-driven fan (if installed) and sensor cover.



1 Screw
2 Connector cover
3 Motor shaft
4 Conical adapter
5 Jacking thread
6 Encoder shaft
7 Screws

Figure 9-2 Motor shaft - encoder shaft connection

Removal

1. Unscrew the screw (1).
2. Remove the connector cover (2).
3. Remove the connector with signal cable.
4. Unscrew the screws (9.07) for the torque bracket.
5. Unscrew the encoder screw (9.05) (make sure that the motor rotor does not also start to rotate).
6. Remove the encoder from the motor shaft:
   - You can remove the encoder directly by inserting a special screw (see diagram).
   - If a special screw is not available, you can remove the encoder by inserting a threaded pin (e.g. DIN 913 M5 x 30) into the end of the motor shaft to protect the centering hole thread and then inserting a screw M6 x min. 40.

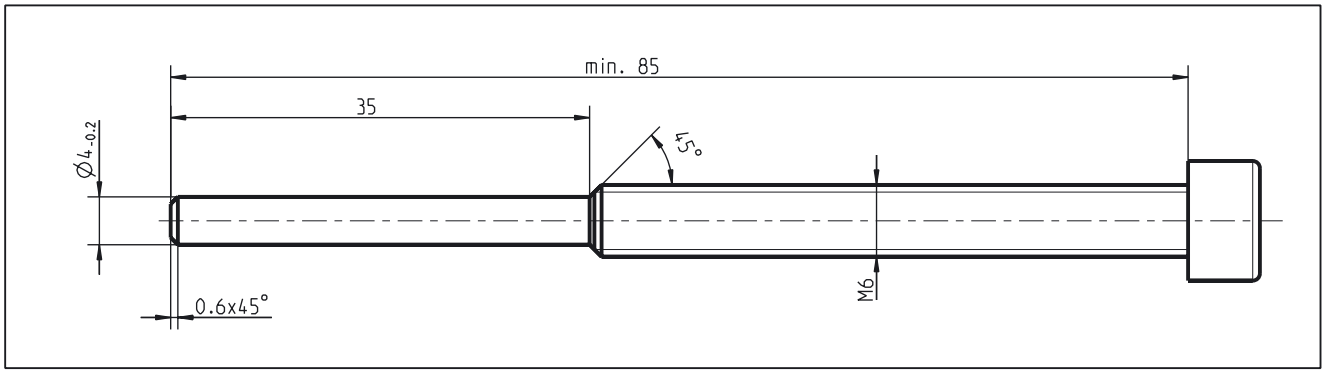


Figure 9-3 Special screw

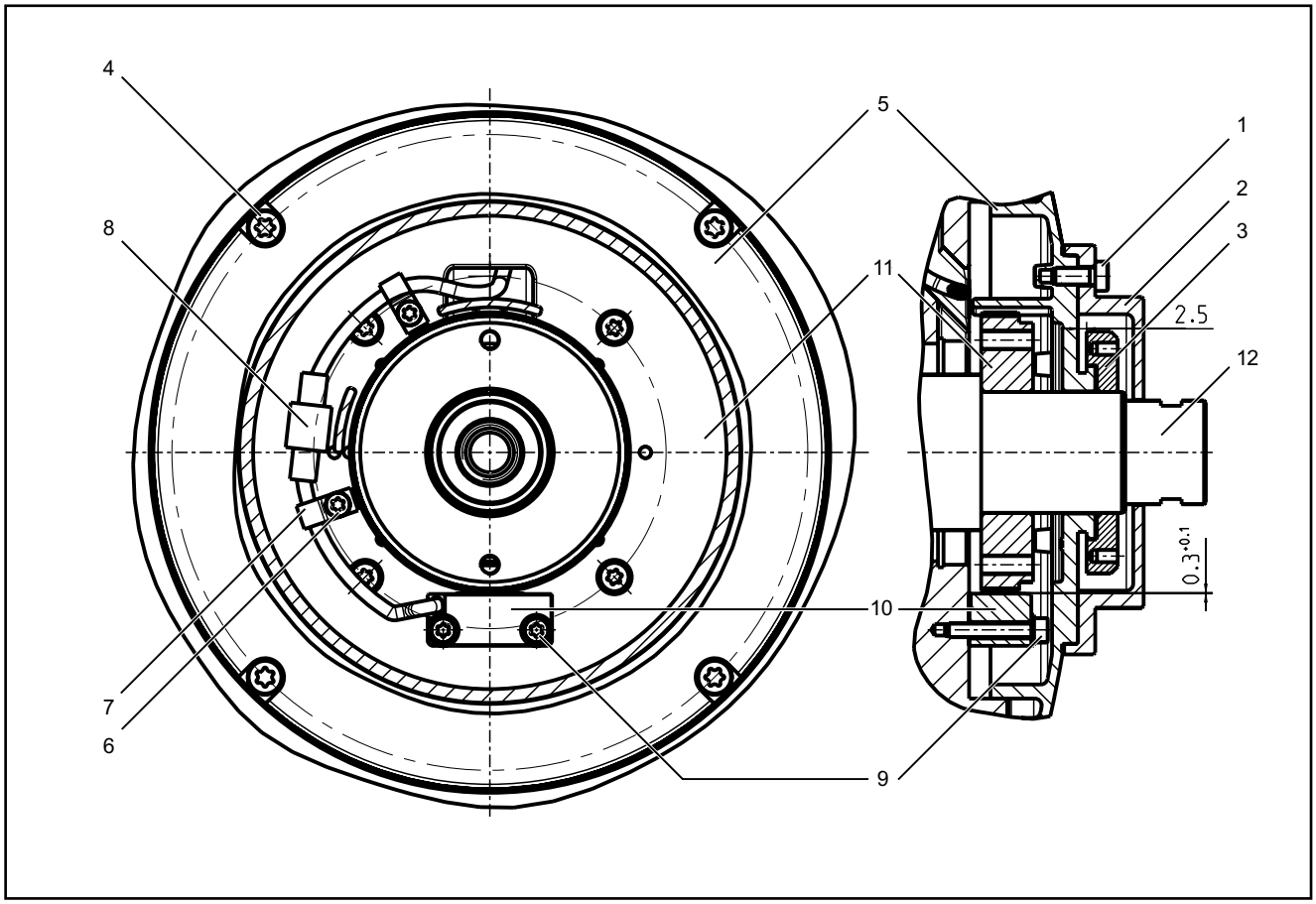
Installation

1. Screw the torque bracket (9.06) onto the encoder by means of screws (7) and secure (e.g. with Loctite 243). Note the distance between the torque bracket and encoder (this step does not need to be carried out if the encoder is already mounted).
2. If necessary, remove the threaded pin (used earlier to remove the encoder).
3. Unscrew the screw (1) for the replacement encoder.
4. Remove the connector cover (2) for the replacement encoder. Place the encoder (with torque bracket) (9.06) onto the cone of the motor rotor and screw in the encoder screw (9.05) (tightening torque 5 $^{-1}$ Nm). Make sure that the motor rotor does not also start to rotate.
5. Secure the torque bracket (9.06) by means of screws (9.07) on the bearing shield (6.01) (note the radial deflection of the encoder).
6. Press on the metal sleeve for the connector cable.

7. Insert the connector with signal cable and place the cable into the guide.
8. Attach the connector cover (2) with the screw (1) and secure (e.g. with Loctite 243).

NOTICE
With synchronous motors, the encoder system has to be realigned.

9.2.4 Removing/installing the rotor encoder



1	Screws	7	Clip
2	Cover	8	Connector
3	Balancing weight	9	Screws
4	Screws	10	Scanning unit
5	Cover	11	Rotor
6	Screw	12	Motor shaft

Figure 9-4 Built-in rotor encoder

Removal

1. Unscrew the screws (1) and remove the cover (2).
2. Pull out the balancing weight (3).
3. Unscrew the screws (4) and remove the cover (5).
4. Scanning unit:
   - Remove the screw (6) and clip (7).
   - Remove the connector (8) for the signal cable.
   - Remove the screws (9) with washers and remove the scanning unit (10).
5. Rotor:
   - Pull out the rotor (11).

Installation

To install the encoder, carry out the above steps in reverse order. The following differences should be noted, however:

1. Heat up the rotor (11) (max. 150°C), push it onto the motor shaft (12) and allow it to cool down.
   Note! Inductive heating is not permitted.
2. The screws (9) for attaching the scanning unit (10) are secured (e.g. with Loctite 243).
3. The installation dimensions (see "Built-in rotor encoder") must be observed.

9.2.5 Replacing the DRIVE-CLiQ interface (encoder module)

Only trained Siemens service engineers are authorized to replace the DRIVE-CLiQ interface (Sensor Module).

CAUTION

Electrostatic discharge

Electronic modules contain components that can be destroyed by electrostatic discharge. These modules can be easily destroyed if they are not handled properly.

To protect your equipment against damage, follow the instructions given in the chapter ESD Guidelines.

⚠WARNING

Motor-specific Sensor Module

The Sensor Module contains motor/sensor-specific data and an electronic nameplate.

If you operate a different Sensor Module on the motor, this can result in serious injury or death, or cause considerable material damage.

Only operate the Sensor Module on the original motor. Do not install the Sensor Module on other motors. Do not replace the Sensor Module with a Sensor Module from a different motor.

9.2.6 Tightening torque for screwed connections

For screwed connections with metal contact surfaces (e.g. bearing end shields, active bearing components, or terminal box parts screwed onto the stator housing), the following tightening torques apply (depending on the thread size) with a tolerance of ±10 %, property class 8.8 and 8 or higher, to DIN ISO 898.

Table 9- 3 Tightening torque for screwed connections

Thread diameter	M4	M5	M6	M8	M10	M12	M16
Tightening torque [Nm]	3	5	9	24	42	70	165

Bolt locking devices

Nuts or bolts that are mounted together with locking, resilient and/or force-distributing elements (e.g. safety plates, spring-lock washers, etc.) must be refitted together with identical, fully functional elements.

Always renew keyed elements.

Spare parts

10

Note

The diagram provided is merely intended as an example of the different motor versions and does not claim to detail every aspect of the different versions.

The spare parts are available from our Service Centers in parts kits and can be ordered by specifying the motor designation.

1.00 DE bearing assembly, complete
- 1.01 Bearing cap
- 1.02 Screw
- 1.03 USIT washer
- 1.04 O-ring
- 1.05 Cover
- 1.06 Grease slinger
- 1.07 Rolling-contact bearings
- 1.08 Screw

3.00 Rotor, complete

4.00 Stator, complete

6.00 NDE bearing assembly (complete)
- 6.01 Bearing shield, NDE
- 6.02 Rolling-contact elements
- 6.03 Screw
- 6.04 O-ring
- 6.05 O-ring bearing
- 6.06 Distance piece
- 6.07 Corrugated spring
- 6.08 Plug

7.00 Fan module, complete
- 7.01 Fan motor
- 7.02 Screw

8.00 Terminal box, complete
- 8.01 Terminal board with special screws

9.00 Installation

- 9.01 Encoder, complete
- 9.02 Encoder cover
- 9.03 Screw
- 9.04 O-ring
- 9.05 Screw
- 9.06 Torque bracket
- 9.07 Screw
- 9.08 Signal connector with encoder cable

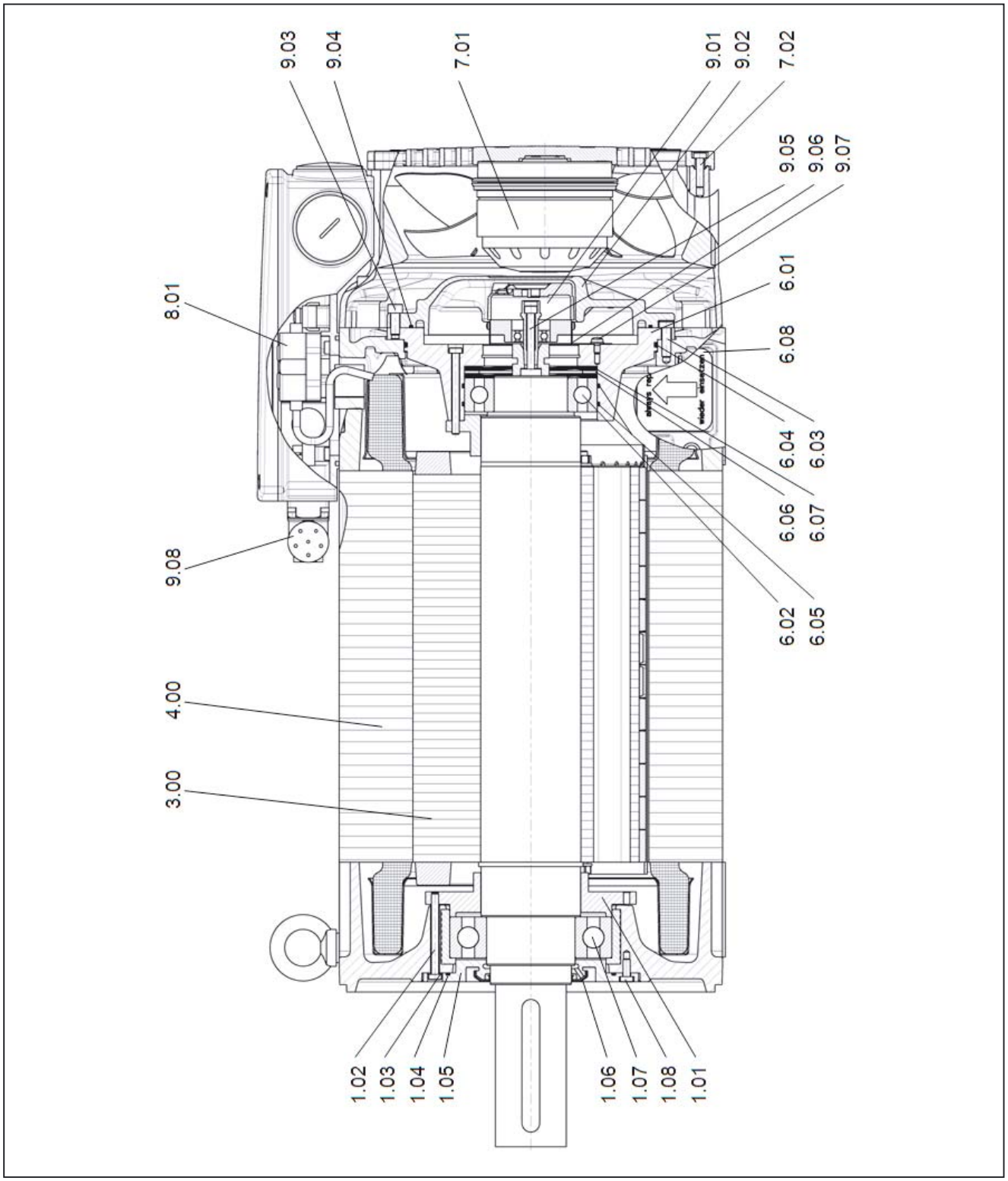


Figure 10-1 Spare parts (example)

Decommissioning and disposal 11

11.1 Decommissioning

Components

Sort the components for recycling according to whether they are:

- Electronics waste (e.g. sensor electronics)
- Iron to be recycled
- Aluminum
- Non-ferrous metal (e.g. motor windings)
- Insulating materials

Process materials and chemicals

Sort the process materials and chemicals for recycling according to whether they are:

- Oil

  Dispose of the spent oil as special waste in accordance with the spent oil ordinance.
- Grease
- Solvents
- Cleaner solvent
- Paint residues

  Do not mix solvents, cleaner solvents, and paint residues.

Insulating materials

Electrical insulation materials are mainly used in the stator. Some additional components are made of similar materials and must, therefore, be handled in the same manner. The insulating materials in question are used on the following items of equipment:

- Various insulators used in terminals boxes
- Voltage and current transformers
- Electric cables
- Instrument wiring
- Surge arrester
- Capacitors

Copper recovery

Some components (e.g. stator) contain a considerable amount of copper. This copper can be recovered from the electrical insulation in a heat treatment process, which involves gasifying the organic binding materials. To ensure that the vapors burn properly, the oven must be equipped with a suitable afterburner. The following conditions are recommended for heat-treating and afterburning to minimize process emissions:

Table 11- 1 Heat treating

Temperature	380 … 420 °C (716 … 788 °F)
Duration	Once 90% of the target temperature has been reached, the object must be kept at that temperature for at least five hours.

Table 11- 2 Afterburning of the binding material vapors

Temperature	850 … 920 °C (1562 … 1688 °F)
Flow velocity	The binding material vapors must remain in the combustion chamber for at least 3 seconds.

NOTICE
Emissions
The emissions mainly constitute O_2-, CO-, CO_2-, NO_x-, C_xH_y gases and microscopic particles. As the operator, you are responsible for ensuring that the heat treatment process complies with local regulations.

Anti-corrosion agent

Anti-corrosion agents that cover the surface of the motor can be removed by means of a gasoline-based cleaning agent and a rag. Dispose of the rag in accordance with local regulations.

11.2 Disposal

11.2.1 Introduction

Protecting the environment and preserving its resources are corporate goals of the highest priority for us. Our worldwide environmental management system to ISO 14001 ensures compliance with legislation and sets high standards in this regard. Environmentally friendly design, technical safety and health protection are always firm goals even at the product development stage.

Recommendations for the environmentally friendly disposal of the machine and its components are given in the following section. Be sure to comply with local disposal regulations.

11.2.2 Preparing for disassembly

Disassembly of the machine must be carried out and/or supervised by qualied personnel with appropriate expert knowledge.

1. Contact a certified waste disposal organization in your vicinity. Clarify what is expected in terms of the quality of dismantling the machine and provision of the components.
2. Follow the five safety rules.
3. Disconnect all electrical connections.
4. Remove all liquids such as oil, water, …
5. Remove all cables.
6. Deatch the machine fixings.
7. Transport the machine to a suitable location for disassembly.

Refer also to the information in the section headed "Maintenance".

11.2.3 Dismantling the motor

Dismantle the machine using the general procedures commonly used in mechanical engineering.

⚠WARNING

Machine parts can fall

The machine is made up of heavy parts. These parts are liable to fall during dismantling. This can result in death, serious injury, or material damage.

Secure the machine parts being dismantled to prevent them falling.

The motors must be disposed of in accordance with national and local regulations as part of the standard recycling process or they can be returned to the manufacturer.

The encoder electronics must be properly disposed of electronic waste.

11.2.4 Disposing of permanent magnets

Permanent magnets must be demagnetized prior to disposal. This helps avoid potential hazards caused by permanent magnets during and after disposal. Permanent magnets are heated to demagnetize them.

Demagnetizing permanent magnets

Permanent magnets can be demagnetized in one of the following ways:

- Arrange for the entire machine to be subject to thermal treatment by a specialist disposal company.
- Return the machine to the manufacturer who can then remove and demagnetize the rotor and/or permanent magnets. Rotors that are still installed and have not been demagnetized must not be transported.

NOTICE
Removing the rotor The rotor in a machine containing permanent magnets must only be removed by the manufacturer. Contact the Siemens Service Center.

11.2.5 Disposing of components

Components

The machines mainly comprise steel as well as various copper and aluminum elements. Metals can always be recycled.

Sort the components for recycling according to whether they are:

- Iron and steel
- Aluminum
- Non-ferrous metal (e.g. motor windings)

  The winding insulation is incinerated during copper recycling.
- Insulating materials
- Cables and wires
- Electronic waste

Process materials and chemicals

Sort the process materials and chemicals for recycling according to whether they are for example:

- Oil
- Grease
- Cleaning substances and solvents
- Paint residues
- Anti-corrosion agent

Dispose of the separated components according to local regulations or via a specialist disposal company. The same goes for cloths and cleaning substances which have been used while working on the machine.

Packaging material

- If necessary, contact a suitable specialist disposal company.
- Wooden packaging for sea transport consists of impregnated wood. Observe the local regulations.
- The foil used for water-proof packaging is an aluminum composite foil. It can be recycled thermically. Dirty foil must be disposed of via waste incineration.

11.2.6 Disposing of insulating liquid

Used MIDEL 7131® or residue of insulating liquid can be incinerated in a suitable plant. The waste disposal code is 130309 ("readily biodegradable insulating and heat transmission oils").

Arrange for the insulating liquid to be disposed of by a waste disposal company.

Appendix

A

A.1 Siemens Service Center

Contact for further information

Details about the design of this electrical machine and the permissible operating conditions are described in these operating instructions.

If you wish to request a field service visit or order spare parts, please contact your local Siemens sales office. This office will contact the service center on your behalf.

If you have any technical queries or require additional information, please contact the Siemens Service Center.

Table A- 1 Technical support

Europe - Germany:	Telephone:	+49 (0)180 - 50 50 222
	Fax:	+49 (0)180 - 50 50 223
America - USA:	Telephone:	+1 423 262 2522
Asia - China:	Telephone:	+86 1064 719 990
E-mail:		support.automation@siemens.com
Internet English:		http://www.siemens.com/automation/support-request
Internet Deutsch:		http://www.siemens.de/automation/support-request

A.2 Declaration of conformity

SIEMENS

EG-Konformitätserklärung

EC Declaration of Conformity

No. 664.20036.21

Hersteller: *Manufacturer:*	**Siemens AG** **Industry Sector** **DT MC EWN**
Anschrift: *Address:*	**Industriestraße 1** **97615 Bad Neustadt a. d. Saale** **Germany**
Produktbezeichnung: *Product description:*	**Drehstrommotoren, Synchron und Asynchron, Typ 1PH8...** *AC – motors, synchronous and asynchronous, type 1PH8...* Achshöhen / *shaft heights* 80, 100, 132, 160

Die bezeichneten Produkte stimmen in der von uns in Verkehr gebrachten Ausführung mit den Vorschriften folgender Europäischer Richtlinie überein:
The products described above in the form as placed on the market are in conformity with the provisions of the following European Directive:

2006/95/EG	Richtlinie des Europäischen Parlaments und des Rates zur Angleichung der Rechtsvorschriften der Mitgliedstaaten betreffend elektrische Betriebsmittel zur Verwendung innerhalb bestimmter Spannungsgrenzen. *Directive of the European Parliament and of the Council on the Harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits.*

Die Konformität mit der Richtlinie wird nachgewiesen durch die Einhaltung folgender Normen:
Conformity to the Directive is assured through the application of the following standards:

EN 60204-1; EN 60034-1*)
) mit allen relevanten Teilen / *with all relevant parts

Die Sicherheitshinweise und Betriebsanleitung sind zu beachten.
The safety and manual documentation have to be considered in detail.

CE - Kennzeichnung: 2008 / *CE marking: 2008*

Herstellererklärung zur Europäischen Richtlinie 98/37/EG (ab 29. Dezember 2009; neu 2006/42/EG)
Die gelieferten Produkte sind ausschließlich zum Einbau in Maschinen bestimmt. Die Inbetriebnahme ist solange untersagt, bis die Konformität des Endproduktes mit der Maschinenrichtlinie festgestellt ist. Alle Sicherheitshinweise der zugehörenden Produktdokumentation sind zu beachten sowie dem Endanwender zur Kenntnis zu geben.

Manufacturer's Declaration to European Directive 98/37/EC (from 29. December 2009; new 2006/42/EC)
The products supplied are intended exclusively for installation in machines. Commissioning is prohibited until it has been established that the end product conforms with this Directive. All safety instructions in the associated product documentation must be observed and given to the end user for his/her information.

Bad Neustadt, den 16/4/08

Siemens Aktiengesellschaft

Dr. Hans Peter Zerbes,
Leiter Elektromotorenwerk
Elektromotorenwerk Bad Neustadt

Dr. Jan Dainat,
Leiter der Abteilung Technik (KT)

Diese Erklärung bescheinigt die Übereinstimmung mit der genannten Richtlinie, ist jedoch keine Beschaffenheits- oder Haltbarkeitsgarantie nach §443 BGB.
This declaration certifies the conformity to the specified directive, but does not imply any warranty for of properties.

Ausgabestand / Status: -- /-----
Erstausgabe: 04/2008

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