SIEMENS

Low-voltage motors

1LA,1LE,1LF,1LG,1LP,1PC,1PF,1PK,1PP,1PQ,2KG Standard machines_Operating_Instructions_Compact

Compact Operating Instructions

Introduction

Information for the reader

Explanation of the icons

Information for 1LE1, 1PC1, and 1PC3 machines

Safety notes

Information for those responsible for the plant or system

This electric machine has been designed and built in accordance with the specifications contained in Directive 2006/95/EC ("Low-Voltage Directive") and is intended for use in industrial plants. Please observe the country-specific regulations when using the electric machine outside the European Community.

Follow the local and industry-specific safety and setup regulations.

The persons responsible for the plant must ensure the following:

- Planning and configuration work and all work carried out on and with the machine is only to be done by qualified personnel.
- The operating instructions must always be available for all work.
- The technical data as well as the specifications relating to the permissible installation, connection, ambient and operating conditions are taken into account at all times.
- The specific setup and safety regulations as well as regulations on the use of personal protective equipment are observed.

Note

Use the services and support provided by the appropriate Service Center for planning, installation, commissioning, and servicing work.

In the individual chapters of this document, you will find safety instructions that must be obeyed absolutely, for your own safety, to protect other people and to avoid damage to property.

Observe the following safety instructions for all activities on and with the machine.

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, according to EN 50110-1 ("Working in a voltage-free state). Apply the five safety rules in the order stated before starting work at the machine.

Five safety rules

1. Disconnect the system.
   Disconnect the auxiliary circuits, for example anti-condensation heating
2. Prevent reconnection.
3. Make sure that the equipment is at zero voltage
4. Ground and short-circuit
5. Cover or isolate nearby components that are still live.

To energize the system, apply the measures in reverse order.

Qualified personnel

All work at the machine must be carried out by qualified personnel only. For the purpose of this documentation, qualified personnel is taken to mean people who fulfill the following requirements:

- Through appropriate training and experience, they are able to recognize and avoid risks and potential dangers in their particular field of activity.
- They have been instructed to carry out work on the machine by the appropriate person responsible.

The safe use of electrical machines

⚠ WARNING

Live parts

Electrical machines contain live parts.

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.

- Only remove covers in compliance with the applicable regulations.
- Operate the machines properly.
- Perform regular maintenance on the machine.

⚠ WARNING

Rotating parts

Electrical machines contain dangerous rotating parts.

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.

- Only remove covers in compliance with the applicable regulations.
- Operate the machines properly.
- Perform regular maintenance on the machine.
- Secure free-standing shaft extensions.

⚠ WARNING

Hot surfaces

Electrical machines have hot surfaces.

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.

- Allow the machine to cool down before starting any work on it.
- Only remove covers in compliance with the applicable regulations.
- Operate the machines properly.

Description

Language versions on the Internet

Language versions can be found on the Internet

Internet page: http://www.siemens.com/motors

If you require additional language versions, please contact the Siemens Service Center.

Intended use of the machines

These machines are intended for industrial installations. They comply with the harmonized standards of the series IEC/EN 60034 (VDE 0530). Their use in hazardous areas is forbidden unless the marking on the rating plate expressly permits this operation. If other/more wide-ranging demands (e.g. protection so that they cannot be touched by children) are made in special cases – i.e. use in non-industrial installations – these conditions must have been complied with in the plant or system itself when the motors are installed.

Note

Machine directive

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

Forced ventilation (optional): Cooling method IC 416 in accordance with IEC/EN 60034-6

⚠ WARNING

Hot surfaces

Operating the machine without external fan results in overheating. This may result in personal injury and material damage.

Never commission the machine without an external fan.

Cooling that does not depend on the speed is achieved by means of a separately driven fan wheel (forced ventilation). Forced ventilation does not depend on the operating state of the machine.

The fan wheel for the external flow of cooling air is powered by an independent module and is enclosed by the fan cover.

Degree of protection

The degree of protection the machines feature is stated on the rating plate. They can be installed in dusty or humid environments.

⚠ WARNING

Dangerous voltage

Condensation drain holes (optional)

Inserting objects into the condensation drain holes can damage the winding and can result in death, serious injury and damage to property!

Note the following to maintain the degree of protection:

- Switch off the machine so that it is in a no-voltage condition, before you open the condensation drain holes.
- Close the condensation drain holes (e.g. using T-plugs) before commissioning the machine.

NOTICE

Storage

If the machines are used or stored outdoors, we recommend keeping them under a shelter or an additional cover.

- Avoid exposing them to direct, intense solar radiation, rain, snow, ice, or dust for extended periods.
- If necessary, please consult us or seek advice regarding technical issues.

Environmental requirements

The machines are suitable for operation in tropical climates.

Guide value for the standard version 60 % relative humidity at a coolant temperature (CT) of 40 °C.

Ambient temperature: -20 °C to +40 °C

Installation altitude: ≤ 1000 m

Air with normal oxygen content, usually 21 % (V/V)

If the environmental requirements are different from the details listed here, then the values on the rating plate will apply.

Preparing for use

⚠ WARNING

Use lifting eyes

The machine must only be transported and lifted using the lifting eyes, in a position that is appropriate for its type of construction. Otherwise, it could fall over or slip in the lifting tackle.

This can result in death, serious injury, or material damage.

- Use all the lifting eyes on the machine.
- Any eyes that are screwed in must be tightly fastened.
- Eyebolts must be screwed in right up to their supporting surface.
- If necessary, use suitable, sufficiently-sized transport equipment such as lifting straps (EN1492-1) and lashing straps (EN12195-2).

⚠ WARNING

Suspended transport

If several items of transport material are used for fastening, two straps must be able to carry the whole load.

- Use additional, suitable means of support for transport and during installation.
- Secure the support equipment to prevent it from slipping.

Storage time

Turn the shafts 1x every year to avoid bearing brinelling. Prolonged storage periods reduce the useful life of the bearing grease (aging).

Open bearings

- For open bearings e.g. 1Z, check the state of the bearing grease over 12 months.
- Replace the grease if it can be identified that the grease has lost oil content or has become dirty (ingress of condensation leads to consistency changes of the grease).

Closed bearings

- For closed bearings, replace the DE and NDE bearings after a storage time of 48 months

Mounting, installation

Safety instructions

⚠ WARNING
Hot surfaces Electrical machines have hot surfaces. 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. • Allow the machine to cool down before starting any work on it. • Only remove covers in compliance with the applicable regulations. • Operate the machines properly. It must be ensured that parts (cables etc.) do not come into contact with the machine enclosure.

CAUTION
Before start-up, please check that • the customer has set the correct direction of rotation of the machine - e.g. by decoupling from the driven machine - by taking appropriate measures! • there are no temperature-sensitive parts (cables etc.), which are in contact with the machine enclosure. • condensation drain holes are always located at the lowest point of the motor!

NOTICE
Please note the technical data on the rating plates on the machine enclosure.

Electromagnetic compatibility

NOTICE
If the torque levels are very unequal (e.g. when a reciprocating compressor is being driven), a non-sinusoidal machine current will be induced whose harmonics can have an impermissible effect on the supply system and cause impermissible interference emissions as a result.

NOTICE

Converter

- If operated with a frequency converter, the emitted interference varies in strength, depending on the design of the converter (type, interference suppression measures, manufacturer).
- Prevent the limit values stipulated by EN 61000-6-3 for the drive system (consisting of the machine and converter) from being exceeded.
- You must observe the EMC information from the manufacturer of the converter.
- The most effective method of shielding is to conductively connect a shielded machine supply cable to the metal terminal box of the machine (with a metal screw connection) over a large surface area.
- On machines with integrated sensors (e.g. PTC thermistors), disturbance voltages caused by the converter may occur on the sensor cable.

Balancing

⚠ CAUTION

Safety precautions

- The general touch protection measures for drive output elements must be observed.
- Output elements may only be attached or withdrawn using the correct equipment.
- The feather keys are only secured against falling out during shipping. If you commission a machine without an output element, the feather keys must be secured to prevent them from being thrown out.

The rotors are balanced dynamically. The balancing quality corresponds to vibration severity grade "A" for the complete machine as standard. The optional vibration severity grade "B" is indicated on the rating plate.

The declaration regarding the type of featherkey for balancing is generally marked on the rating plate and optionally on the face of the shaft end.

Designation:

- As a standard measure, balancing is carried out dynamically with a half featherkey (code "H") in accordance with ISO 8821.
- "F" means balancing with a whole featherkey (optional version).
- "N" means balancing without a featherkey (optional version).

Note

Measures conforming to ISO 10816 must be taken in order to compensate any offset between electrical machines and driven machines.
The foundation must be designed according to DIN 4024.

Alignment and fastening

General

When aligning and fastening the machine, please bear the following in mind:

- The machine must be level.
- Feet and flanges must be fastened securely.
- Alignment must be precise in the case of direct coupling.
- Fastening surfaces must be clean
- Look out for any damage to paint; this must be rectified immediately and correctly.
- Look out for traces of anti-corrosion protection agents; these must be removed using mineral turpentine.
- Look out for installation-related resonances with the rotating frequency and double line frequency; these must be prevented.
- Listen for unusual noises when turning the rotor manually.
- Check the direction of rotation with the machine decoupled.
- Avoid using rigid coupling measures.

Flatness of the supporting surfaces for conventional motors

Frame size (FS)	Flatness mm
≤ 132	0.10
160	0.15
≥ 180	0.20

Electrical connection

⚠ WARNING

Note the following safety information before connecting-up the machine:

- Only qualified and trained personnel should carry out work on the machine while it is stationary.
- Disconnect the machine from the power supply and take measures to prevent it being reconnected. This also applies to auxiliary circuits, e.g. anti-condensation heating.
- Check that the machine really is in a no-voltage condition.
- Establish a safe protective conductor connection before starting any work.
- If the incoming power supply system displays any deviations from the rated values in terms of voltage, frequency, curve form or symmetry, such deviations will increase the temperature and influence electromagnetic compatibility.

⚠ WARNING

Line supply with non-grounded neutral point

Operating the machine on a line supply system with a non-grounded neutral point is only permitted over short time intervals that occur rarely, e.g. the time leading to a fault being eliminated (ground fault of a cable, EN 60034-1).

Terminal box

Instructions for terminal boxes

⚠ DANGER

Dangerous voltage

Electric machines contain hazardous voltages.

If the machine is not de-energized and brought into a no-voltage condition, death or serious injury will occur.

When work is carried out on the machine with the terminal box open, it must not be electrically connected!

CAUTION

Damage to property

Note the following information to avoid damage to the terminal box.

- Make sure that the components inside the terminal box e.g. terminal board and cable connections) are not damaged!
- It must be ensured that there are no foreign bodies, dirt or moisture in the terminal box.
  Cable entries into the terminal box according to DIN 42925.
- Close any additional open cable entries with O-rings or suitable flat gaskets, the terminal box itself must be sealed so that it is dust and water tight using the original seal.
- Please observe the tightening torques for cable glands and other screws.
- When performing a test run, secure the feather keys without output elements.

NOTICE

The terminal box must be sealed so that dust and water cannot enter.

Frame sizes 80 to 90

⚠ WARNING

Dangerous voltage

Loosening the safety torx screw can result in death, serious injury or material damage!

Do not loosen the safety torx screw with respect to the center terminal, as this ensures a conductive connection between the grounding conductor and frame!

CAUTION

Serious damage to the machine

Failure to observe these measures will result in serious damage to the machine!

- Do not rotate the terminal box unless the connection cables have not yet been laid.
- If you release the safety torx screw to both sides of the outer connecting terminals, this can destroy the machine!
- Remove the three large snap hooks on the terminal board before rotating the the terminal box. Keep the snap hooks pressed while rotating the terminal box and use a screwdriver to re-engage when finished.

Terminal box 1LE 80...90 optional terminal board

Frame sizes 80 to 90

CAUTION

Arcing at the optional terminal board can destroy the machine

Failure to observe this information can result in destruction of the machine as a result of arcing.

To change the operating mode, always press the jumper fully into the base of the slot and use the red locking lever to ensure that it is engaged.

Protruding connection cables

⚠ WARNING

Short-circuit hazard

During disassembly and particularly when installing the cover plate, make sure that the connection cables are not clamped between enclosure parts and the cover plate.

⚠ CAUTION

It must be ensured that there are no foreign bodies, dirt, or moisture in the terminal base of the machine enclosure.

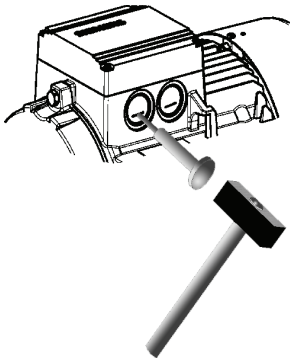
- Use O-rings or suitable flat gaskets to seal entries in cover plates (DIN 42925) and other open entries.
- Seal the terminal base of the machine enclosure using the original seal of the cover plate to prevent dust and water from entering.
- Please observe the tightening torques for cable glands and other screws.
- When performing a test run, secure the feather keys without output elements.

Knockout openings

NOTICE

Knockout openings

- Knockout openings in the terminal box must be knocked out using appropriate methods.
- Take care not to damage the terminal box or its interior components (the terminal board, cable connections, and so on).



Tightening torques

Cable glands

NOTICE
Take care not to damage the cable jacket. Tightening torques must be adapted to suit the type of cable jacket material in use.

You should refer to the table in order to find the correct tightening torque for any metal and plastic cable glands that are to be mounted directly on the machine, as well as for any other screw-type connections (such as adapters).

Table 1 Tightening torques for cable glands

	Metal ± 10% Nm	Plastic ± 10% Nm	Clamping range in mm		O ring Cord ∅ mm
			Standard -30 °C ... 100 °C Ex -30 °C ... 90 °C	Ex -60 °C ... 105 °C	
M 12 x 1,5	8	1,5	3,0 ... 7,0	-	2
M 16 x 1,5	10	2	4,5 ... 10,0	6,0 ... 10,0	
M 20 x 1,5	12	4	7,0 ... 13,0	6,0 ... 12,0	
M 25 x 1,5			9,0 ... 17,0	10,0 ... 16,0	
M 32 x 1,5	18	6	11,0 ... 21,0	13,0 ... 20,0	
M 40 x 1,5			19,0 ... 28,0	20,0 ... 26,0	
M 50 x 1,5	20		26,0 ... 35,0	25,0 ... 31,0	
M 63 x 1,5			34,0 ... 45,0	-	

Terminal boxes, end shields, grounding conductors, sheet metal fan covers

Note

The specified tightening torques are applicable unless other values are indicated.

Table 2 Tightening torques for screws on the terminal box, end shields, screw-type grounding conductor connections

	Thread ∅		M 4	M 5	M 6	M 8	M 10	M 12	M 16	M20
	Nm	min	2	3.5	6	16	28	46	110	225
		max	3	5	9	24	42	70	165	340

Table 3 Tightening torques for self-tapping screws on the terminal box, end shields, screw-type grounding conductor connections, sheet metal fan covers

	Thread ∅		M 4	M 5	M 6
	Nm	min	4	7,5	12,5
		Max.	5	9,5	15,5

General information on conductor connection

Cross-sections that can be connected depending on the size of the terminal (possibly reduced due to size of cable entries)

Frame sizes 80 to 90

⚠ WARNING

Short-circuit hazard

Electric machines contain hazardous voltages.

If the appropriate precautions are not taken, death or serious physical injury can occur.

- Do not lay connection cables over the central dome of the terminal board.
- Observe the opening direction and the mounting position of the cover washers on the terminal board.

General information on connecting the grounding conductor

Note

The machine's grounding conductor cross-section must comply with DIN EN 60034-1 .

Please also observe installation regulations such as those specified in IEC 60204-1..

Connection to the converter

⚠ CAUTION

The standard insulating system is suitable for converter voltages up to 460 V. For higher voltages, a special insulating system must be used or special measures must be taken, e.g. an output filter.

CAUTION

Machines must always be connected to frequency converters using shielded machine supply cables. The most effective method of shielding is to conductively connect the cable to the metal terminal box of the machine (with a metal screw connections) over a large surface area.

Note

EMC

Please observe the section containing instructions on ensuring electromagnetic compatibility.

See the list of additional operating instructions: Further documents (Page 28)

Final checks

Before closing the terminal box/terminal base of the machine enclosure, check the following:

- Establish the electrical connections in the terminal box in accordance with the details in the sections above and tighten with the correct torque.
- The clearances between non-insulated parts have been maintained: ≥ 5.5 mm to 690 V, ≥ 8 mm to 1000 V.

- Avoid protruding wire ends!
- In order not to damage the cable insulation, freely arrange the connecting cables.
- Connect the machine corresponding to the specified direction of rotation.
- Keep the inside of the terminal box clean and free from trimmed-off ends of wire.
- Ensure that all seals and sealing surfaces are undamaged and clean.
- Correctly and professionally close unused openings in the terminal boxes.
- The pressure relief device is undamaged (depending on the type of terminal box, this involves either cast-in slots or an overpressure diaphragm). Only repair damage after prior consultation with the person responsible for the safety of the equipment and use only original parts.

Commissioning

Insulation resistance

⚠ WARNING

Working on electrical power installations

Only appropriately trained personnel may carry out this work.

Before starting commissioning, install all covers that are designed to prevent active or rotating parts from being touched, or which are necessary to ensure correct air guidance and thus effective cooling.

⚠ WARNING

Hazardous voltage at the terminals

Dangerous voltages are sometimes present on the terminals during and immediately after measurement of the winding insulation resistance. Contact with these can result in death, serious injury or material damage.

If any power cables are connected, check to make sure line supply voltage cannot be connected. Once you have measured the insulation resistance, discharge the winding by connecting to the ground potential.

Checking the insulation resistance

CAUTION
The insulation resistance needs to be checked prior to start-up and again after any extended periods of storage or periods during which the equipment is not in operation. Before you begin measuring the insulation resistance, please read the operating manual for the insulation resistance meter you are going to use. Disconnect any main-circuit cables that are connected to the terminals before measuring the insulation resistance.

NOTICE
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. Please note that the insulation resistance of dried, clean windings is lower than that of warm windings. The insulation resistance can only be properly assessed after conversion to the reference temperature of 25 °C.

NOTICE
If the measured value is close to the critical value, you must check the insulation resistance at suitably frequent intervals.

Measuring the insulation resistance

1. Before you begin measuring the insulation resistance, please read the operating manual for the insulation resistance meter you are going to use.
2. Disconnect any main circuit cables from the terminals before measuring the insulation resistance.
3. Where possible, measure the insulation resistance of the winding with respect to the motor enclosure when the winding temperature is between 20 ... 30 °C. Different insulation resistance values apply for other temperatures.
4. When measuring, wait until the final resistance value is reached. This is reached after approximately one minute. Then read off the insulation resistance.

Limit values of the stator winding insulation resistance

The following table indicates the measuring circuit voltage and the limit values for the minimum insulation resistance and the critical insulation resistance of the stator winding.

Table 4 Insulation resistance of the stator unwinding at 25 °C

	Rated voltage U_{rated}< 2 kV
Measuring circuit voltage	500 V
Minimum insulation resistance for new, cleaned or repaired windings	10 MΩ
Critical specific insulation resistance after a long operating time	0,5 MΩ / kV

Note the following:

- If the measurements are performed at winding temperatures ≠ 25 °C, convert the measured value to the reference temperature of 25 °C in order to be able to compare the values with the table above.
  - The insulation resistance halves every time the temperature rises by 10 K.
  - The resistance doubles every time the temperature falls by 10 K.
- Dry, new windings have a typical insulation resistance of more than 100 ... 2000 MΩ depending on the winding size, design and rated voltage. An insulation resistance value close to the minimum value could be due to moisture and/or dirt accumulation.
- During operation, the insulation resistance of the windings can fall to the critical insulation resistance due to ambient and operational influences. The critical insulation resistance value for a winding temperature of 25 °C can be calculated by multiplying the rated voltage (kV) by the specific critical resistance value (0,5 MΩ / kV).

  Example:

  Critical resistance for rated voltage U_N = 690 V:

  690 V x 0,5 MΩ / kV = 0,345 MΩ

NOTICE

Critical insulation resistance reached or fallen below

If the critical insulation resistance is reached or fallen below, this can result in damage to the insulation or voltage flashovers.

- Contact your Siemens Service Center.
- If the measured value is close to the critical value, you must check the insulation resistance at suitably frequent intervals.

Measures before commissioning

Once the system has been correctly installed, you should check the following prior to commissioning:

- The machine has been assembled and aligned correctly.
- The machine has been connected so that it rotates in the direction specified.
- The operating conditions match the data specified on the rating plate.
- The bearings have been lubricated as appropriate for the version used. Rolling-contact bearing machines which have been in storage for more than 24 months have been relubricated.
- Any supplementary machine monitoring equipment has been connected correctly and is functioning as it should.
- For versions with bearing thermometers, the bearing temperatures must be checked during the machine's first period of operation. The warning and shutdown values are set on the monitoring device.
- Appropriately configured control and speed monitoring functions ensure that the machine cannot exceed the permissible speeds specified on the rating plate.
- The output elements have the correct settings for their type (e.g. alignment and balancing of couplings, belt forces in the case of a belt drive, tooth forces and tooth face clearance in the case of toothed-wheel power output, radial and axial clearance in the case of coupled shafts).
- The minimum insulation resistance and minimum clearance values have been adhered to.
- The grounding and equipotential bonding connections have been established correctly.
- All fixing screws, connection elements, and electrical connections have been tightened to the specified torques.
- Lifting eyes that were screwed in have been removed following installation or secured to prevent them becoming loose.
- The rotor can turn without coming into contact with the stator.
- All touch protection measures for both moving and live parts have been implemented.
- In cases where the shaft extension is not being used and is, therefore, exposed, it has been covered and the feather key has been secured to prevent it from being thrown out.
- If being used, the external fan is ready for operation and connected so that it rotates in the direction specified.
- The flow of cooling air is not obstructed.
- If a brake is being used, it is functioning correctly.
- The specified mechanical limit speed n_{max} is adhered to.

If the design of the machine requires the converter to be assigned in a particular way, the relevant information will be provided on the rating plate or an additional label.

Note

It may be necessary to perform additional checks and tests in accordance with the specific situation on site.

Operation

Switching on the machine with anti-condensation heating (optional)

⚠ CAUTION

Before switching on, always make sure that the (optional) anti-condensation heating is switched off.

Machine operation

⚠ WARNING

Line supply with non-grounded neutral point

Operating the machine on a line supply system with a non-grounded neutral point is only permitted over short time intervals that occur rarely, e.g. the time leading to a fault being eliminated (ground fault of a cable, EN 60034-1).

⚠ WARNING

Do not remove covers when the motor is running

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

- De-energize the machine and bring it into a no voltage condition before removing any covers.
- Ensure that any covers, which are designed to prevent active or rotating parts from being touched, which are necessary to ensure correct air guidance and thus effective cooling, or which guarantee the degree of protection of the machine, remain closed during operation.

⚠ CAUTION

The surfaces of the machines can reach high temperatures, which can lead to burns if touched.

CAUTION

Minimum load for cylindrical roller bearings

Be sure to comply with the minimum radial load of 30% of the cylindrical roller bearings in accordance with catalog data.

⚠ WARNING

Faults during operation

Deviations from conditions during normal operation, such as an increase in 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 which can result in eventual or immediate death, severe injury or material damage.

- Immediately inform the maintenance personnel.
- If you are in doubt, immediately switch off the machine, being sure to observe the system-specific safety conditions.

CAUTION

Risk of corrosion due to condensation

When changing machines and/or ambient temperatures, air humidity can condense within the machines.

- If available, remove the screw plugs to drain the water depending on the ambient and operating conditions.
- Reinsert them afterwards.

If the machine is equipped with drainage plugs, the water can drain away automatically.

⚠ WARNING

Machines with textile fan covers

The machine fan is not completely protected against contact.
The customer must put suitable measures in place, e.g. housings or protective grating, to prevent manual intervention.

Stoppages

Overview

If the machine remains out of service for an extended period of time (> 1 month), it should be commissioned regularly (around once a month) or, at the very least, the rotor should be turned. Please refer to the instructions in the section titled "Switching on" before recommissioning the machine. If a rotor locking device has been fitted to the machine, you must remove it before the rotor starts to turn.

CAUTION
If the machine is to be out of service for a period in excess of 12 months, you must take suitable anti-corrosion, mothballing, packaging, and drying measures.

Switching on the anti-condensation heater

If an anti-condensation heater is provided, switch it on during the machine stoppages.

Taking the machine out of service

For details of measures that need to be implemented, please refer to Section Preparing for use (Page 6).

Lubricating before recommissioning

CAUTION
The machine must be relubricated during commissioning if it has been out of service for more than 1 year, in order to ensure that the grease is distributed throughout the bearings. The shaft must rotate for the grease to be distributed. Please observe the information on the lubricant plate if carrying out relubrication using relubrication equipment. See also the section titled "Application planning - Bearing lifetime".

Maintenance

⚠ WARNING

Safety instructions

- 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.
- Certain parts of the machine may reach temperatures above 50 °C. Physical contact with the machine could result in burn injuries! Check the temperature of parts before touching them.
- When carrying out cleaning using compressed air, make sure that appropriate methods of extracting fumes are in place and that personal protective gear such as gloves, goggles, face masks, or similar are worn.
- If you are using chemical cleaning agents, observe the instructions and any warnings provided in the relevant safety data sheet. Chemical agents must be compatible with the machine's components, especially if these contain plastics.

Note

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

Maintenance

Regreasing (optional)

General

As a standard feature, the machines have rolling-contact bearings which are permanently lubricated with grease (UNIREX N3, made by ESSO). A regreasing device is possible as an option. In this case, you can find information about relubrication intervals, quantities and types of grease, and, if required, additional data on the rating plate or lubricant plate.

Note

Do not mix different types of grease!

Prolonged storage periods reduce the useful life of the bearing grease. Check the condition of the grease if the equipment has been in storage for more than 12 months. If the grease is found to have lost oil content or to be contaminated, the

machine must be immediately relubricated before commissioning. For information on permanently-greased bearings, please refer to the section titled Bearings (Page 25).

Note

Regreasing

1. Clean the grease nipples at the drive end and non-drive end.
2. Press in the type and quantity of grease specified (see rating/lubricant plate data).

- Please observe the information on the rating and lubricant plates.
- Regreasing should be carried out when the machine is running (max. 3600 rpm)!

The bearing temperature rises sharply at first, then drops to the normal value again when the excess grease is displaced out of the bearing.

Cleaning

Cleaning the greasing channels and used grease chambers

The used grease collects outside each bearing in the used grease chamber of the outer bearing cap. When replacing bearings, remove the used grease.

NOTICE
You have to separate the active parts of the bearings to replace the grease that is in the greasing channel.

Cleaning the cooling air passages

Regularly clean the cooling air passages through which the ambient air flows, e.g. using dry compressed air.

NOTICE
Never direct compressed air in the direction of the shaft outlet or machine openings.

In the case of machines with textile fan covers, regularly remove fluff balls, fabric remnants, and similar types of contamination (particularly at the air passage opening between the fan cover and cooling fins of the machine enclosure) to ensure that the cooling air can flow without obstruction.

NOTICE
The frequency of the cleaning intervals depends on the local degree of contamination.

⚠ WARNING
Particularly when carrying out cleaning using compressed air, make sure you use suitable extraction equipment and wear personal protective gear (safety goggles, respiratory filter, etc.).

Repair

Instructions for repair

Qualified personnel

Only appropriately qualified persons should be deployed to commission and operate equipment. Qualified persons, as far as the safety instructions specified in this manual are concerned, are those who have the necessary authorization to commission, ground and identify/tag equipment, systems and circuits in accordance with the relevant safety standards.

Instructions relevant to safety

⚠ WARNING
Before you begin working on the three-phase machine, in particular before you open the covers of active parts, make sure that the three-phase machine or system is properly isolated from the supply.

NOTICE
If it is necessary to transport the machine, carefully observe the information provided in Chapter Preparing for use !

Bearings

Take the bearing used up to frame size 90 only for special versions, and generally for frame size 100 and higher from the rating plate.

Bearing lifetime

Prolonged storage periods reduce the useful life of the bearing grease. In the case of permanently lubricated bearings, this leads to a shorter bearing lifetime.
Bearing or grease replacement is recommended after a storage time of 12 months, for longer than 4 years, replace the bearings or grease.

Replacing bearings

Recommended interval after which bearings are to be replaced under normal operating conditions:

Table 5 Bearing replacement intervals

Coolant temperature	Principle of operation	Bearing replacement intervals
40° C	Horizontal coupling operation	40 000 h
40° C	With axial and radial forces	20 000 h

Note

Special operating conditions

Examples of factors that can reduce operating hours are vertical machine installation, high vibrational and impact loads, frequent reversing, higher coolant temperature, higher speeds, etc.

NOTICE
Do not reuse bearings that have been removed.

Dismantling

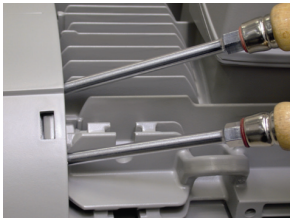
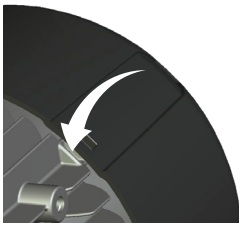
NOTICE
Before commencing disassembly, you should mark how each of the fastening elements has been assigned, as well as how internal connections are arranged, for re-assembly purposes.

Fan

Take care not to damage the snapping mechanisms on fans that are equipped with these. To ensure this, the fans should be heated to a temperature of approximately 50 °C around the area of the hub. If any damage is caused, request new parts.

Fan cover

- Carefully lever the snap openings on the cover out of the snap-in lugs one after the other; do not apply the lever directly under the web (risk of breakage).
- Do not damage the snap mechanisms. If any damage is caused, request new parts.

Canopy; incremental encoder under the canopy

Loosen the fixing screws on the external surface of the protective cover.

Under no circumstances should the spacing bolts be disassembled or forcibly separated from each other or the cover. Forcibly removing or separating the spacing bolts or fan cover can result in damage to them.

Installation

NOTICE
Avoid damaging the windings protruding out of the stator enclosure when fitting the end shield.

Spare parts

General

In addition to the exact part designation, please specify the machine type and the serial number in all orders for spare parts.

Appendix

SIEMENS Service Center

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

Field service visits and spare parts

If you wish to request a field service call or order spare parts, please contact your local Siemens sales office. This office will contact the responsible service center on your behalf. You can find your local contact partner here.

Technical queries or additional information

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

Please have the following machine data ready:

- Machine type
- Serial number

You can find this data on the rating plate of the machine.

Service numbers

Table 6 Siemens Service Center contact details

Time zone	Telephone	Fax	Internet
Europe / Africa	+49 911 895 7222	+49 911 895 7223	http://www.siemens.com/automation/support-request (http://www.siemens.de/automation/support-request)
Americas	+1 423 262 2522	+1 423 262 2200	mailto:techsupport.sea@siemens.com
Asia / Pacific	+86 1064 757 575	+86 1064 747 474	mailto:support.asia.automation@siemens.com

Further documents

These operating instructions can also be obtained at the following Internet site:

http://www.siemens.com/motors

General Documentation

1.517.30777.30.000	1XP8001 encoder
5.610.70000.02.015	External fan
5.610.70000.10.020	Spring-loaded brake
5 610 00002 09 000	Incremental encoder 1XP8012-1x
5 610 00002 09 001	Incremental encoder 1XP8012-2x

Siemens AG
Industry Sector
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