

# Axial fans

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## Operating Instructions

To keep things manageable, these operating instructions do not contain all detailed information on all types of products and do not cover every conceivable installation, operation or maintenance situation. Please request this information from your dealer if you desire additional information or if special problems arise that are not covered in the operating instructions. Furthermore, we point out that the contents of these installation instructions are neither part of nor can they modify a previous or existing agreement, commitment or a legal relation. All Süd-Electric obligations result from the respective bill of sale, which also contains the complete and solely valid warranty stipulations. These contractual warranty stipulations are neither expanded nor restricted through the explanations in these operating instructions. The right to technical changes is retained at all times.

## Application

Süd-Electric axial fans from the series LA, LB, LC, LD, LK, LL, LG, LM, LO, LS are not ready-for-use products but have been conceived as components for air conditioning, ventilation and exhaust air removal systems. A special motor design enables speed control through voltage reduction. When operating on frequency converters, please comply with the instructions in the operating conditions section. The fans may only be operated if they are installed in accordance with their intended use and safety has been secured through protective equipment in accordance with ISO 13852 (DIN EN ISO 12100) or other structural protective measures.

The fans may only be operated when they are installed as intended, and when safety is ensured by safety equipment according to DIN EN 294 (DIN EN ISO 12 100) or by other protection measures.

<p><b>WARNING</b></p> 	<p><b>Hazardous voltages and dangerous rotating machine parts</b>          Death, severe injuries, property damage</p> <ul style="list-style-type: none"> <li>➤ Any work on the fan whatsoever may only be carried out by qualified specialists</li> <li>➤ Safety, installation and warning notices must be complied with</li> <li>➤ Impeccable operation, proper transport, professional storage, erection and installation as well as conscientious operation and maintenance</li> </ul>
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## Definitions

### Qualified personnel


In the sense of the operating instructions and the warnings on the product itself, persons who are familiar with the erection, installation, commissioning and operation of the product, who comply with all relevant regulations / standards and who have the corresponding qualification


for their job, such as:

- Apprenticeship or instruction and authorization to connect or disconnect electrical circuits, to ground them or to label them in accordance with safety engineering standards.
- Apprenticeship or instruction in accordance with safety engineering standards regarding care and use of suitable safety equipment.
- Training in First Aid.

<p>DANGER</p> 	<p>means death or severe injury or significant property damage will occur if the corresponding precautions are not taken.</p>
<p>WARNING</p> 	<p>means death or severe injury or significant property damage can occur if the corresponding precautions are not taken.</p>
<p>CAUTION</p> 	<p>with a warning triangle means minor injuries can occur if the corresponding precautions are not taken</p>
<p>CAUTION</p>	<p>without a warning triangle means property damage can occur if the corresponding precautions are not taken.</p>
<p>ATTENTION</p>	<p>means an undesirable result or condition can arise if the corresponding warning is not heeded.</p>

## Safety information

<p>WARNING</p> 	<p><b>Explosive-prone areas</b>          Death, severe injuries and/or property damage through explosion hazard</p> <ul style="list-style-type: none"> <li>➤ Do not use in explosion endangered areas authorized to convey dusts, gasses, mist, vapours or mixtures thereof! This is not permissible. Explosion hazards, e.g. due to sparks, high temperatures.</li> </ul>
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<p><b>WARNING</b></p> 	<p><b>Solid matter or solids content in the carrier vehicle (air)</b>          Danger of injury through the ejection of parts, damage to the fan is possible</p> <ul style="list-style-type: none"> <li>➤ The fan is only intended for the conveyance of air or mixtures similar to air</li> <li>➤ The conveyance of solid matter or solids content in the carrier vehicle is not permissible</li> </ul>
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- Operate the fan only in the ranges stated on the rating plate and only for the intended use according to your order.
- The max. allowed operating specifications on the rating plate apply to an atmospheric density of  $\rho = 1.2 \text{ kg/m}^3$ .
- The thermostat switches integrated in the winding or PTC thermistors act as motor protection and must be connected!

<p><b>CAUTION</b></p>	<p><b>PTC test voltage not greater than 2.5V</b>          The PTC can become defective, leading to damage to the fan through overheating possible</p> <ul style="list-style-type: none"> <li>➤ permissible test voltage max. 2.5 V</li> </ul>
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- You must use a motor protection switch in motors without thermostat switches! When the motor is jammed/ tight, the motor protection switch triggers, protecting it from a shortcircuit and overloading.
- Compliance with the FCC EMC directives applies in connection with closed loop controls and control devices. The manufacturer or operator of the entire system is responsible for compliance with these directives, especially with FCC / CFR 47. (EMC directive 89/336/EEC is to be complied with for re-import into the European economic area)
- Comply with the instructions on service and maintenance.
- These operating instructions are part of the product and, as such, are to be kept accessible.
- A separate fault and performance monitoring-system with an alarm signal function is necessary in order to prevent personal injuries and material damages during malfunctions and in case the device fails. Substitute operation must be taken into consideration!

## Transport, storage

- Care is imperative to ensure the fan arrives at its destination in first-class condition. If there are any signs of careless handling or transportation damage, immediately report this to the shipping company and to your Ziehl-Abegg or Süd-Electric sales office.
- Süd-Electric axial fans are properly packed in the factory for the respectively agreed to form of transport.
- Transport the fan(s) either in the original packaging or, in the case of larger fans, on the dedicated transportation fixtures (holes in the supporting arms, wall plates) using a suitable means of transportation.


<p><b>CAUTION</b></p> 	<p><b>Suspended load</b>          Death or crushing through falling loads</p> <ul style="list-style-type: none"> <li>➤ Never walk under suspended loads</li> </ul>
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- Observe the weight data on the identification plate.

<p><b>CAUTION</b></p> 	<p><b>Transport on the connection cable</b>          Damage to the fan or the electrical connection possible          Death through electric shock possible</p> <ul style="list-style-type: none"> <li>➤ Never transport the fan by the connection cable</li> </ul>
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- Avoid impacts and collisions including to fans installed on devices.
- Watch out for possible damage to the packaging or fan.
- Store the fan in its original packing dry and weather protected.
  - Cover the open pallet with tarpaulins and protect the fan from becoming soiled (e.g. shavings, stones, wires, etc.)
- Keep the storage temperature to between – 22F and + 104F
- Prevent excessively long storage periods (we recommend a maximum of one year). Before installing, check for the proper functioning of the motor bearing suspension. Corrosion and ageing of mechanical components, bearings, etc. can occur due to too long storage times (>1 year). That can lead to possible preliminary damage and a reduced useful life of the fans.

## Installation


<p><b>WARNING</b></p> 	<p><b>Death, severe injuries and/or damage to the fan are possible when working on the fan</b></p> <ul style="list-style-type: none"> <li>➤ Any kind of work installation, electrical connection, commissioning is to be carried out by qualified personnel only.</li> </ul>
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- The system or plant manufacturer is responsible that the system related installation and safety notices are in accordance with the applicable standards and regulations (DIN EN ISO 12100 / ISO 13852).
  - Use screws with a property class of 8.8 to fasten to a stationary motor flange. Secure all threaded joints, e.g. with Loctite.
  - Permissible torque:  
 Fan blades assembly: M5 = 7 Nm; M6 = 10 Nm; M8 = 25 Nm  
 Grid and fan fittings: M5 = 9 Nm; M6 = 15 Nm; M8 = 35 Nm; M10 = 60 Nm; M12 = 100 Nm
- The following applies to all axial fan models:
  - Do not install distorted. The installation area must be level.
  - Ensure gap is uniform. Strain due to uneven support can lead to failure of the fan due to abrasion of the impeller.

- In the case of a vertical motor axis, the respective lowercondensation drain hole must be open (does not apply to protection class IP44 fans).
- Electrical connection according to circuit diagram. The circuit diagram is located in the terminal box.

<p><b>DANGER</b></p> 	<p><b>Fatal electric shock from metal cable glands in the plastic terminal boxes possible if incorrectly connected</b></p> <ul style="list-style-type: none"> <li>➤ Do not use metal cable glands in plastic terminal boxes, as there is no potential equalization via the plastic terminal boxes.</li> </ul>
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- The terminal box must be tightly sealed.
- The torque for the cover threading on the terminal box cover: plastic version 2 Nm, metal version 3 Nm
- Fasten the fan connecting cable using cable ties to the guard grille or motor braces.
- Connect a thermostat switch or PTC with a triggering device so that no independent restarting is possible during excess temperature malfunctions.

<p><b>WARNING</b></p> 	<p><b>Independent restarting after cooling off is not permissible</b></p> <p>Damage to the fan possible</p> <ul style="list-style-type: none"> <li>➤ The temperature switch must be correctly inserted into the control circuit.</li> <li>➤ We assume no liability for proper functioning when motor protection devices from external suppliers are used.</li> <li>➤ Before restarting, analyze and repair the faults (e.g. storage damage, soiling, etc.)</li> </ul>
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- When connecting multiple motors, the thermostat switch or temperature sensor must be connected in series! When doing so, be sure a temperature malfunction in one motor disconnects all motors together.

## Operating Conditions

- Do not operate the fan in explosive atmospheres.
- Switching frequency:
  - The fan is rated for continuous duty S1 (i.e. operation with a constant load that is applied as long as the machine can reach thermal equilibrium).


<p><b>CAUTION</b></p>	<p><b>Extreme switching frequency</b></p> <p>Damage to the windings possible</p> <ul style="list-style-type: none"> <li>➤ The controller must not permit extreme switching modes</li> </ul>
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- Süd-Electric axial fans are suitable for operation with frequency converters if the following points are complied with:
  - All-pole effective sinusoidal filters are placed between the inverter and the motor (sinusoidal output voltage! Install phase to phase, phase to protective conductor) exactly as they are supplied by some inverter manufacturers. See Süd-Electric download “Operating instructions”: “technical information frequency converters” .
  - Frequency inverters from the Ziehl-Abegg Fcontrol series have an integrated all-pole effective sinusoidal filter!

<b>CAUTION</b>	<p><b>du/dt filters (also called motor or damping filters)</b>          Damage to the winding and motor bearing is possible</p> <ul style="list-style-type: none"> <li>➤ du/dt filters must not be used instead of sinusoidal filters.</li> </ul>
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- When using sinusoidal filters, it might be possible to omit shielded motor lines, metal terminal boxes and a second grounding connection to the motor (inquire at the sinusoidal filter supplier).
- When operating via a frequency converter, you must reckon with increased leakage current (greater than 3.5 mA). Therefore, you must comply with locally prescribed protective measures, such as increased cross-section or a 2<sup>nd</sup> protective conductor for contact protection.
- During speed control using electronic voltage reduction (phase control), increased noise levels can occur due to resonances, depending on the installation situation. Here, we recommend additionally installing a type GFD noise filter.
- During speed control using voltage reduction, please observe a current increase in the partial load area can occur that is greater than the rated current. **ATTENTION: We assume no liability for proper functioning when voltage controllers and frequency converters from external suppliers are used.**
- Continuous soundlevels greater than 70dB(A) are possible; see product catalogue. Continuous sound-level pressures larger than 85dB(A); wear hearing protection.


## Start-up operation

<p><b>WARNING</b></p> 	<p><b>Contact protection (guard grille)</b>          Danger of injury through body parts being pulled in or crushed!</p> <ul style="list-style-type: none"> <li>➤ The guard grille must securely prevent reaching into rotating parts</li> <li>➤ In case of an integrated, inaccessible installation, a suction-side guard grille in accordance with IP20 IEC 60529 is stipulated</li> <li>➤ For accessible installations, a suction-side and pressure side guard grille according to IP20 EN60529 is prescribed</li> <li>➤ Safety components, e.g., guard grilles, may neither be removed nor circumvented nor put out of service.</li> </ul>
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- Before initial operation, check the following:
  - The installation and electrical connections have been carried out in accordance with good professional practice.
  - Installation remnant materials and foreign objects have been removed from the fan cavity.
  - Have all fastening elements been tightened to the prescribed torque?
  - The protective earth is connected.
  - Protective motor switch / PTC thermistor have been professionally connected and are functional.
  - Cable entry is sealed (see "Installation").
  - Do the installation position and the arrangement of the condensation drain holes correspond to each other?
  - Does the connection data comply with the specifications on the rating plate?
  - Do the operating capacitor specifications (1~motor) match the data on the identification plate?
- Start-up may only begin when all safety notices have been verified and all hazards have been excluded.
  - Verify the rotational direction / direction of air conveyance. See the rotary direction arrow on the fan.
  - Watch out for smooth operation. Strong vibrations due to uneven motion (imbalance), e.g., caused by transportation damage or improper handling can lead to failure.

## Maintenance, servicing


- The axial fan is provided with "for-life" lubricated ball bearings. The fan is maintenance free during the lubrication service-life period (30,000 – 40,000 operating hours for standard applications): Replace the bearings before the end of the lubrication service-life period or in case of damage. Ask for our maintenance instructions or contact our service department about this (special tool!). When replacing the bearing, use only original ball bearings.
- In 1~ motors, the capacitor value decreases over time. The life expectancy is ca. 30,000 h based on IEC 60252
- Periodical servicing including cleaning is necessary in order to prevent imbalance caused by a build-up of dirt.

<p><b>WARNING</b></p> 	<p><b>Cleaning the fan</b>          Death or severe injury can be caused by electric shock</p> <ul style="list-style-type: none"> <li>➤ Never use a high-pressure cleaner (steam-jet), and in no case on a running fan</li> <li>➤ Disconnect electricity from the fan before wet cleaning</li> </ul>
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- Watch out for vibration free motion
- Service intervals in accordance with the degree of contamination of the impeller.

<p><b>CAUTION</b></p>	<p><b>During long down times in a humid atmosphere</b>          Damage to the winding is possible</p> <ul style="list-style-type: none"> <li>➤ Run the fans for at least 2 hours per month in order to evaporate any moisture that may have entered</li> <li>➤ Prevent long standstill times as far as possible</li> </ul>
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- IP44 protection-class fans: open the existing closed condensation drain-hole from time to time as needed.
- Allow maintenance work to be carried out by trained specialists only.
- Observe the safety instructions and work regulations during all service and maintenance work

<p><b>WARNING</b></p> 	<p><b>Repair and maintenance of the fan</b>          Death or severe injury can be caused by electric shock or by objects flying out</p> <ul style="list-style-type: none"> <li>➤ Open the electrical circuit and secure against being switched back on</li> <li>➤ Do not perform any service on a running fan!</li> <li>➤ Before reconnecting, free up the fan's airways - Danger due to objects flying out!</li> </ul>
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- Pay attention to untypical operating noises!
- Please contact our service department about any other damage (e.g., winding damage).

## **Manufacturer / Service**

Our products are manufactured in accordance with the relevant international regulations.  
If you have any questions concerning the use of our products or plan special uses, please contact:

**Süd-Electric AG**

**Westring 1-7**

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## **Service address**

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