

MANUAL

NORDAC SK 700E

Frequency inverter

SK 700E-151-340-A ... SK 700E-163-340-O-VT
(1.5kW ... 160kW, 3~ 380-480V)



SK 700E with option: Parameterbox

BU 0700 EN

Getriebebau NORD

GmbH & Co. KG





NORDAC SK 700E frequency inverter



Safety and operating instructions for the drive power converter

(as per: Low voltage guideline 73/23/EEC)

1. General information

During operation, drive power converters may have, depending on their protection class, live, bare, moving or rotating parts or hot surfaces.

Unauthorised removal of covers, improper use, incorrect installation or operation leads to the risk of serious personal injury or material damage.

Further information can be found in this documentation.

All transportation, installation and initialisation and maintenance work must be carried out by **qualified personnel** (compliant with IEC 364, CENELEC HD 384, DIN VDE 0100, IEC 664 or DIN VDE 0110, and national accident prevention regulations).

For the purposes of these basic safety instructions, qualified personnel are persons who are familiar with the erection, installation, commissioning and operation of this product and who have the relevant qualifications for their work.

2. Intended use

Drive power converters are components intended for installation in electrical systems or machines.

When being installed in machines, the drive power converter cannot be commissioned (i.e. implementation of the proper use) until it has been ensured that the machine meets the provisions of the EC directive 89/392/EEC (machine directive); EN 60204 must also be complied with.

Commissioning (i.e. implementation of the proper use) is only permitted when the EMC directive (89/336/EEC) is complied with.

The drive power converters meet the requirements of the low voltage directive 73/23/EEC. The harmonised standards in prEN 50178/DIN VDE 0160, together with EN 60439-1/VDE 0660 Part 500 and EN 60146/VDE 0558 were applied for the drive power converter.

Technical data and information for connection conditions can be found on the rating plate and in the documentation, and must be complied with.

3. Transport, storage

Information regarding transport, storage and correct handling must be complied with.

4. Installation

The installation and cooling of the equipment must be implemented as per the regulations in the corresponding documentation.

The drive power converters must be protected against impermissible loads. In particular, no components must be bent and/or the insulation distances changed during transport and handling. Touching of electronic components and contacts must be avoided.

Drive power converters have electrostatically sensitive components that can be easily damaged by incorrect handling. Electrical components must not be mechanically damaged or destroyed (this may cause a health hazard!).

5. Electrical connections

When working on drive power converters which are connected to high voltages, the applicable national accident prevention regulations must be complied with (e.g. VBG 4).

The electrical installation must be implemented as per the applicable regulations (e.g. cable cross-section, fuses, earth lead connections). Further information is contained in the documentation.

Information about EMC-compliant installation – such as shielding, earthing, location of filters and installation of cables – can be found in the drive power converter documentation. These instructions must also always be observed for drive converters with CE approval. Compliance with the limit values specified in the EMC regulations is the responsibility of the manufacturer of the system or machine.

6. Operation

Systems where drive power converters are installed must be equipped, where necessary, with additional monitoring and protective equipment as per the applicable safety requirements, e.g. legislation concerning technical equipment, accident prevention regulations, etc. Modifications to the drive power converter using the operating software are permitted.

After the drive power converter is disconnected from the power supply, live equipment components and power connections should not be touched immediately because of possibly charged capacitors. Comply with the applicable information signs located on the drive power converter.

All covers must be kept closed during operation.

7. Maintenance and repairs

The manufacturer documentation must be complied with.

These safety instructions must be kept in a safe place!

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1 General information

The series NORDAC SK 700E is the follow-on development of the proven vector series. These devices are characterised by the high modularity and excellent control characteristics.

These devices are provided with non-sensor vector current control system which constantly ensures an optimised voltage-to-frequency ratio in combination with a motor model of an three-phase asynchronous motor. This has the following significance for the drive: Peak start-up and overload torques at constant speed.

Due to its modular construction, the variously combinable technology units, customer units and special extension units, this device series is suitable for all possible applications.

Devices for constant load:

Due to the numerous setting options, these inverters are capable of controlling all three-phase motors. The performance range goes **from 1.5kW to 22kW** (3~ 380V...480V) with an integrated line filter and from **30kW to 132kW** (3~ 380V...480V) with optional external line filter. The overload capacity of these devices is 200% for 3.5 seconds and 150% for 60 seconds.

Device for quadratically increasing loads SK 700E-163-340-O-VT:

In the performance range **160kW** (3~ 380V...480V) a variant for quadratically increasing load is available. This load profile is typical for **fans and various pump applications**. In contrast to the devices used for constant load torque, the overload capacity here is limited to 125%.

NOTE: The SK 700E with the performance range **30kW to 160kW** varies in some technical details from the lower performance devices. Details can be found in this manual.

This manual is based on the device software **V3.3 Rev0 (P707)** for the SK 700E. If the frequency inverter used has a different version, this may lead to some differences. If necessary, you can download the current manual from the Internet (<http://www.nord.com/>)

1.1 Overview

Properties of the basic device:

- Heavy starting torque and precise motor speed control setting with sensorless current/vector control.
- Can be mounted next to each other without additional spacing
- Permissible environmental temperature range: 0 to 50°C (please refer to technical data)
- Integrated line filter for limit curve A as per EN 55011 (up to and including 22kW)
- Automatic measurement of the stator resistance
- Programmable direct current braking
- Integrated brake chopper for 4 quadrant drive
- Four separate online switchable parameter sets

The characteristics of the basic equipment with an additional technology unit, customer unit or special extension unit are described in Chapter 3, 'Operation and displays'.

1.2 Delivery

Check the equipment **immediately** after delivery/unpacking for transport damage such as deformation or loose parts.

If there is any damage, contact the carrier immediately and implement a thorough assessment.

Important! This also applies even if the packaging is undamaged.

1.3 Scope of supply

Standard design: Mounting unit IP 20
Integrated brake chopper
Integrated line filter for limit curve A as per EN 55011 (up to and including 22kW)
Blanking cover for technology unit slot
Shield angle
Operating manual

Available accessories: Brake resistor, IP 20 (Chapter 2.7/2.8)
Line filter for limit curve A or B as per EN 55011, IP 20 (Chapter 2.3/2.4)
Line and output choke, IP 00 (Chapter 2.5/2.6)
Interface converter RS 232 → RS 485 (supplemental description BU 0010)
NORD CON, PC parameterising software
p-box (ParameterBox), external control panel with LCD plain text display, connection cable (supplemental description BU 0040 DE)

Technology unit: ControlBox, detachable control panel, 4-figure 7-segment LED display
ParameterBox, detachable control panel with background illuminated LCD plain text display
RS 232, accessory component for RS 232 interface
CANbus, accessory component for CANbus communication
Profibus, accessory component for Profibus DP
CANopen, Bus switch-on
DeviceNet, Bus switch-on
InterBus, Bus switch-on
AS interface

Additional BUS manuals
are available..

> www.nord.com <

Customer units: Basic I/O, limited scope for signal processing
Standard I/O, moderate scope for signal processing and RS 485
Multi I/O, high scope for signal processing
CAN I/O, Bus switch-on via CANbus
Profibus I/O, Bus switch-on via Profibus DP

Special extension units: PosiCon I/O, positioning component (supplemental description BU 0710 DE)
Encoder I/O, incremental encoder input for speed control

1.4 Safety and installation information

NORDAC SK 700E frequency inverters are equipment for use in industrial high voltage systems and are operated at voltages that could lead to severe injuries or death if they are touched.

- Installation and other work may only be carried out by qualified electricians and when the device is disconnected. The manual must always be available for these persons and must be complied with.
- Local regulations for the installation of electrical equipment as well as for accident prevention must be complied with.
- The equipment continues to carry hazardous voltages for up to 5 minutes after being switched off at the mains. The equipment may only be opened or the cover or control element removed 5 minutes after the equipment has been disconnected from the power supply. All covers must be put back in place before the line voltage is switched back on again.
- Even during motor standstill (e.g. caused by a release block, blocked drive or output terminal short circuit), the line connection terminals, motor terminals and braking resistor terminals may still conduct hazardous voltages. A motor standstill is not identical to galvanic isolation from the mains.



- **Attention**, even parts of the control card and, in particular, the connection plug for the removable technology units can conduct hazardous voltages. The control terminals are mains voltage free.
- **Warning**, under certain settings the frequency inverter can start automatically after the mains are switched on.
- The circuit boards contain highly-sensitive MOS semiconductor components that are particularly sensitive to static electricity. Avoid touching circuit tracks and components with the hand or metallic objects. Only the terminal strip screws may be touched with insulated screwdrivers when connecting the cables.
- The frequency inverter is only intended for permanent connection and may not be operated without effective earthing connections that comply with local regulations for large leak currents ($> 3.5\text{mA}$). VDE 0160 requires the installation of a second earthing conductor or an earthing conductor cross-section of at least 10 mm^2 .
- Normal **FI-circuit breakers** are not suitable as the sole protection in three-phase frequency inverters when local regulations do not permit a possible DC proportion in the fault current. The standard FI circuit breaker must comply with the new design as per VDE 0664.
- The inverter must be mounted in a switch cabinet that is suitable for its immediate surroundings. In particular it must be protected from excess humidity, corrosive gases and dirt.
- In normal use, NORDAC SK 700E frequency inverters are maintenance free. The cooling surfaces must be regularly cleaned with compressed air if the ambient air is dusty.

ATTENTION! DANGER TO LIFE!

**The power unit can continue to carry voltages for up to 5 minutes after being switched off at the mains.
Inverter terminals, motor cables and motor terminals may carry voltage!**

Touching open or free terminals, cables and equipment components can lead to severe injury or death!



CAUTION

- Children and the general public must be kept away from the equipment!
- The equipment may only be used for the purpose intended by the manufacturer. Unpermitted modifications and the use of spare parts and additional equipment that has not been bought from or recommended by the equipment manufacturer can lead to fire, electric shock and injury.
- Keep these operating instructions in an accessible location and ensure that every operator uses it!

Warning:



This product is covered under marketing classification IEC 61800-3. In a domestic environment, this product can cause high frequency interference, which may require the user to take appropriate measures. An appropriate measure would be the inclusion of a recommended line filter.

1.5 Certifications

1.5.1 European EMC guideline

If the NORDAC SK 700E is installed according to the recommendations in this instruction manual, it meets all EMC directive requirements, as per the EMC product standard for motor-operated systems EN 61800-3.

(See also Chapter 8.3 Electromagnetic compatibility [EMC].)



1.5.2 UL and cUL certification

(Used in North America)

"Suitable for use on a circuit capable of delivering not more than 5000 rms symmetrical amperes, 380...480 Volts (three phase)" and "when protected by J class fuses." as indicated."

Suitable for use on a circuit capable of delivering not more than 5000A (symmetrical), 380...460 Volts (three phase) and when protected by "J class fuses" as described in Chap. 7.4.

NORDAC SK 700E frequency inverters have motor overload protection. Further technical details can be found in Chapter 7.4.



2 Assembly and installation

2.1 Installation

NORDAC SK 700E frequency inverters are available in various sizes depending on the output. When installed in a control cabinet, the size, power dissipation and perm. ambient temperature must be taken into account to prevent device failures.

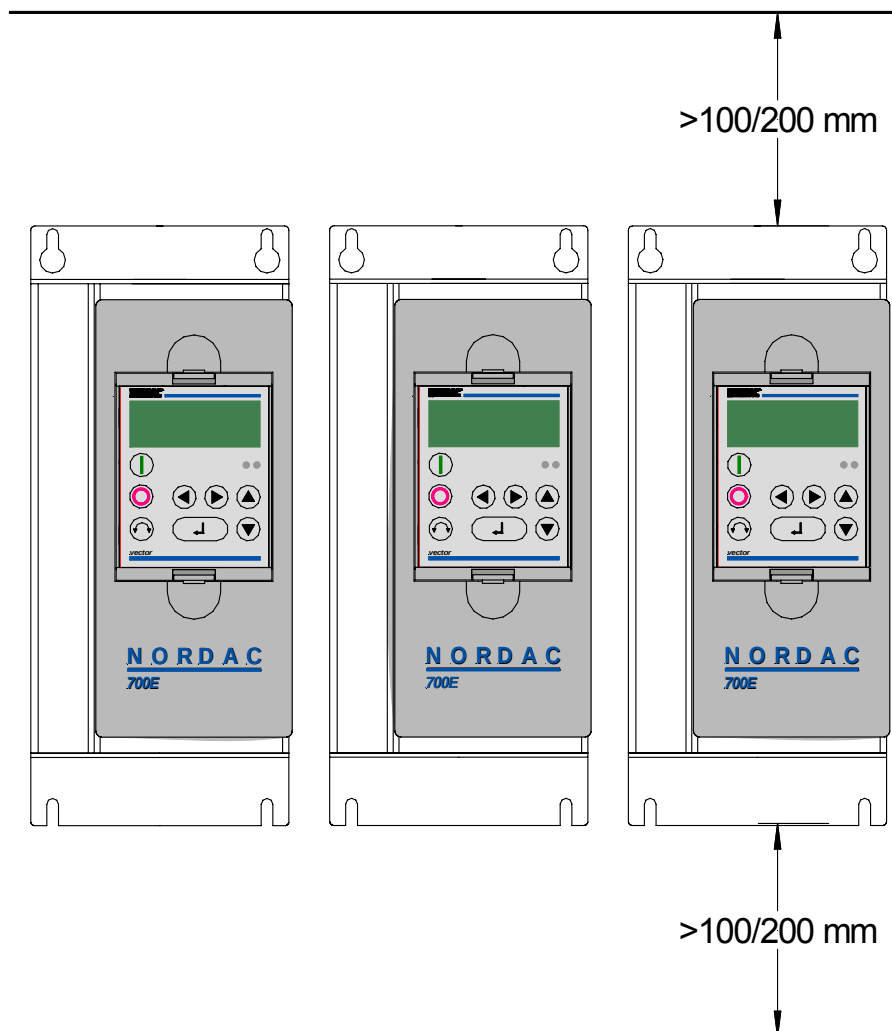
The equipment requires sufficient ventilation to protect against overheating. Reference values apply here for the spaces above and below the frequency inverter within the control cabinet.

(up to and inc. 22kW, above > 100mm, below > 100mm and from and inc. 30kW above > 200mm, below > 200mm)

Electrical components (e.g. cable ducts, contactors, etc.) can be located within these limits. There is a height-dependent minimum separation distance from the frequency inverter for these components. This distance must be a minimum 2/3 of the object height. (Example: cable duct 60mm high $\rightarrow 2/3 \cdot 60\text{mm} = 40\text{mm}$ gap)

Additional side gaps for devices up to and inc. 55kW are not required. Mounting can be immediately next to each other. The installation position is normally vertical. It must be ensured that the cooling ribs on the rear of the device are covered with a flat surface to provide good convection.

Warm air must be vented above the device!



If several inverters are arranged above each other, ensure that the upper air entry temperature limit is not exceeded. (See also Chapter 7, Technical data). If this is the case, it is recommended that an "obstacle" (e.g. a cable duct) is mounted between the inverters so that the direct air flow (rising warm air) is impeded.